



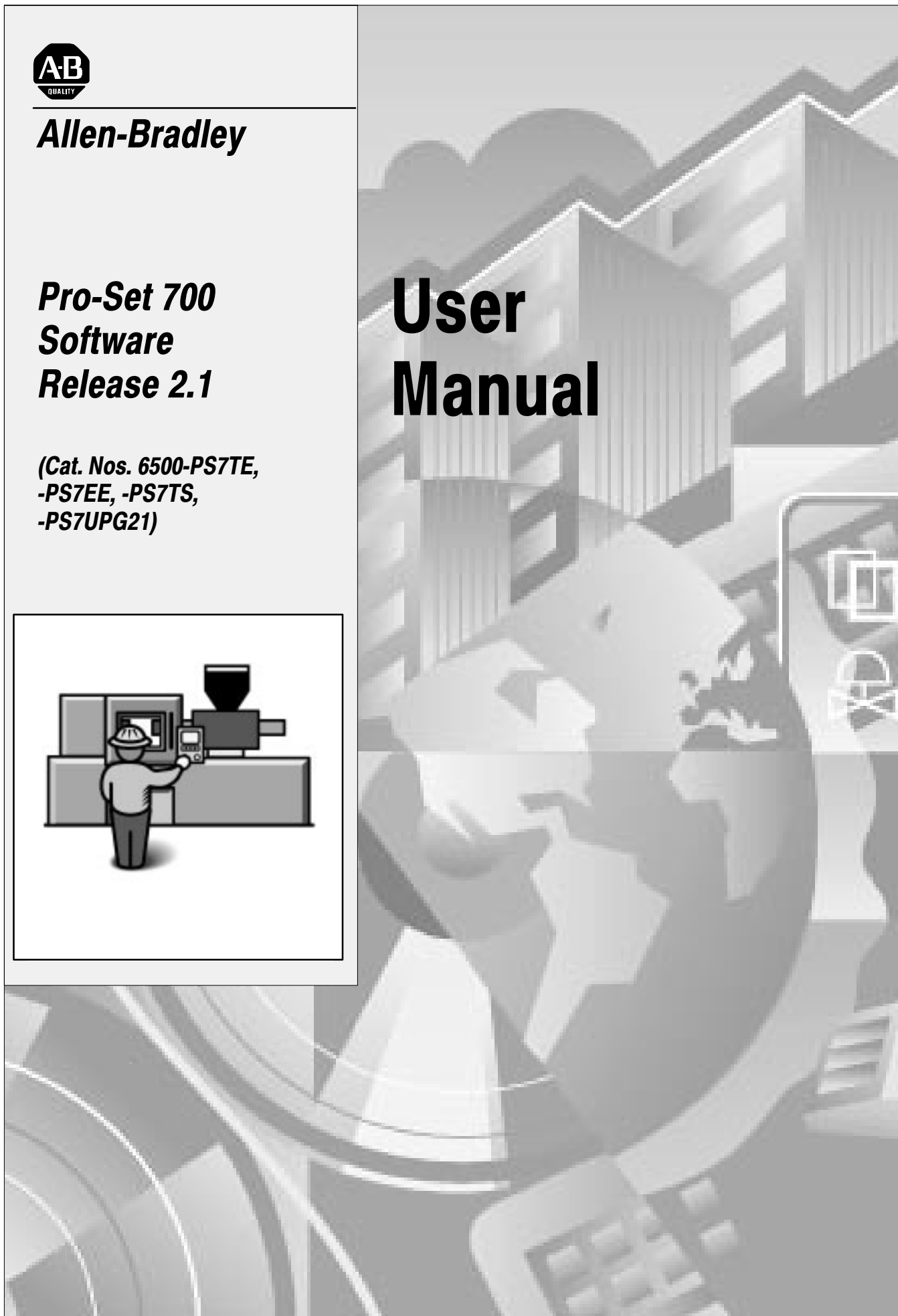
Allen-Bradley

***Pro-Set 700
Software
Release 2.1***

***(Cat. Nos. 6500-PS7TE,
-PS7EE, -PS7TS,
-PS7UPG21)***



User Manual



Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation, and Maintenance of Solid-State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

Reproduction of the contents of this copyrighted publication, in whole or in part, without written permission of Allen-Bradley Company, Inc., is prohibited.

Throughout this manual we use notes to make you aware of safety considerations:



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss.

Attention statements help you to:

- identify a hazard
- avoid the hazard
- recognize the consequences

Important: Identifies information that is critical for successful application and understanding of the product.

New Information

Pro-Set 700 Release 2.1 is a complete upgrade to previous releases of Pro-Set 700 software. Use only the manuals provided in this documentation set with this release. Discard previous versions of Pro-Set 700 system manuals.

To help you find new and updated information, look for change bars as shown to the right of this paragraph.

Compliance to European Union Directives

If this product has the CE mark it is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

EMC Directive

This product is tested to meet Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) and the following standards, in whole or in part, documented in a technical construction file:

- EN 50081-2EMC – Generic Emission Standard, Part 2 – Industrial Environment
- EN 50082-2EMC – Generic Immunity Standard, Part 2 – Industrial Environment

This product is intended for use in an industrial environment.

Low Voltage Directive

This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61131-2 Programmable Controllers, Part 2 – Equipment Requirements and Tests.

For specific information required by EN 61131-2, see the appropriate sections in this publication, as well as the following Allen-Bradley publications:

- Industrial Automation Wiring and Grounding Guidelines For Noise Immunity, publication 1770-4.1
- Guidelines for Handling Lithium Batteries, publication AG-5.4
- Automation Systems Catalog, publication B111

Table of Contents

Important User Information	-1
New Information	P-1
Compliance to European Union Directives	Page 3
EMC Directive	Page 3
Low Voltage Directive	Page 3
Using Pro-Set 700 Documentation	P-1
What's in This Preface?	P-1
How to Use the Documentation Set	P-1
Who Should Use This Manual?	P-2
What Abbreviations, Acronyms, and Initialisms are Used in This Manual?	P-2
What Conventions Are Used in This Manual?	P-3
We call your attention to helpful information like this:	P-3
We show examples like this:	P-3
We show pathnames, commands, and filenames like this: ..	P-3
We show variable text that you type like this:	P-3
We show buttons that you push like this:	P-3
We show screens that you see like this:	P-3
We show active menu selections like this:	P-3
We show references to other Allen-Bradley manuals like this:	P-4
We show references to a chapter within the same manual like this:	P-4
What Other Publications Are Available?	P-4
What's Next?	P-4
Quick Start for the Experienced User	1-1
What's in This Chapter?	1-1
Before You Begin	1-1
Understanding the Tasks You Will Perform	1-1
Getting Started with Pro-Set 700 Software	1-3
Get an Overview of the Pro-Set 700 Injection Molding Control System (Chapter 2)	1-3
Learn Your Way Around Pro-Set 700 Software (Chapter 3)	1-3
Start the Software	1-3
Use the Keypad	1-3
Log on to the System	1-3
Log off of the System	1-3
Change your Password	1-4
Use Menus	1-4

Use Menu Shortcuts	1-4
Enter Data	1-4
Download Data	1-4
Select a Language	1-4
Use On-line Help	1-5
Configure Pro-Set 700 System Modules (Chapter 4)	1-6
Set up Sensor Inputs (Chapter 5)	1-6
Set up Jogs to Define Clamp, Screw, and Ejector Motion (Chapter 6)	1-6
Span Sensors Through Their Linear Operating Range (Chapter 7)	1-7
Span Position Sensors	1-7
Span Pressure Sensors	1-8
Span RPM Sensors	1-8
Set up Outputs to Valves (Chapter 8)	1-10
Set up Ramps (Chapter 9)	1-10
Set up Profiles (Chapter 10)	1-10
Span Valves (Chapter 11)	1-11
Span Pressure Valves	1-11
Span Velocity Valves	1-11
Set up the Clamp to Mold Parts (Chapter 12)	1-14
Set up the Ejector to Mold Parts (Chapter 13)	1-14
Set up the Injector to Mold Parts (Chapter 14)	1-14
Interpret Alarms (Chapter 15)	1-15
Acknowledge Alarms	1-15
Acknowledging Messages	1-15
Use the Mold/Part Storage Feature (Chapter 16)	1-16
Save a File	1-16
Restore a File	1-16
Entering a New Name or Description	1-17
Cut, Copy, and Paste a File	1-17
Compare and Export a File	1-18
Tune your Machine (Chapter 17)	1-19
Tune PID Pressure Loops	1-19
Tune PID Velocity Loops	1-20
Use the Production Monitor Screen (Chapter 18)	1-21
Enter Data	1-21
Monitor Data	1-21
What's Next?	1-22

System Overview	2-1
What's in This Chapter?	2-1
What Does Pro-Set 700 Software Do?	2-1
What Are the Components of a Molding Control System? ...	2-2
What Do I Need to Do?	2-3
What is the Injection Molding Process?	2-4
Inject	2-4
Clamp Open	2-5
Eject	2-5
Clamp Close	2-6
How is the Injection Molding Process Controlled?	2-6
Clamp Close	2-7
1st, 2nd, 3rd Close	2-7
Low-pressure Close	2-8
Inject Phase	2-10
Injection	2-11
Transition	2-12
Pack (optional)	2-12
Hold	2-13
Pre-decompression (optional)	2-13
Plastication	2-14
Post-decompression (optional)	2-15
Clamp Open	2-15
1st, 2nd, and 3rd Open	2-16
Open Slow	2-17
Eject	2-18
Ejector Advance	2-19
Ejector Retract	2-20
Other Eject Features	2-20
What's Next?	2-20
 Finding Your Way in Pro-Set 700 Software	 3-1
What's in This Chapter?	3-1
Starting Pro-Set 700 Software	3-1
Using the Keypad	3-3
System Setup and Control	3-3
Injection Molding Profiles	3-4
Cursor Movement	3-5
Data Entry	3-5
Selection Keys	3-5
Logging on to the System	3-6
Logging off of the System	3-8
Changing Your Password	3-9

Using Menus	3-10
Moving across the Menu Bar	3-10
Opening a Menu	3-11
Moving through a Menu	3-11
Using Menu Shortcuts	3-12
Entering Data	3-13
Typing a Value	3-13
Selecting from a List	3-14
Using a Pop-Up Keyboard	3-14
Downloading Data	3-15
Selecting a Language	3-15
Using On-line Help	3-16
What's Next?	3-16
 Configuring Pro-Set 700 System Modules	 4-1
What's in This Chapter?	4-1
What Basic Modules Do I Need to Order?	4-1
What Optional Modules Should I Order?	4-1
Determining the Modules' Positions in the I/O Chassis	4-2
Defining System Hardware	4-3
Determining and Recording I/O Ranges	4-5
Configuring QDC Modules	4-7
Configuring Temperature Control Modules	4-8
Setting up Temperature Loops	4-8
Setting up PID Gains	4-12
Configuring the SPI Module	4-13
What's Next?	4-14
 Setting up Sensor Inputs	 5-1
What's in This Chapter?	5-1
How Do I Set up Sensor Inputs?	5-1
Setting up a Position Sensor	5-2
Setting up a Pressure Sensor	5-3
Setting up Alarms for Pressure Sensors	5-4
Setting up the Screw RPM Sensor	5-5
What's Next?	5-6

Setting up Jogs	6-1
What's in This Chapter?	6-1
How Do I Set up Jogs?	6-1
Setting up Jog %-Outputs	6-1
Writing Ladder Logic to Implement Jogging	6-2
Setting up Jogs for the Injection Screw	6-4
Entering and Adjusting %-Outputs	6-4
Entering Jog Alarms for High RPM or Pressure	6-6
Setting up Jogs for the Clamp and Ejector	6-6
Entering and Adjusting %-Outputs	6-6
Entering Jog Alarms for High Pressure	6-7
What's Next?	6-8
 XXX	 7-1

Using Pro-Set 700 Documentation

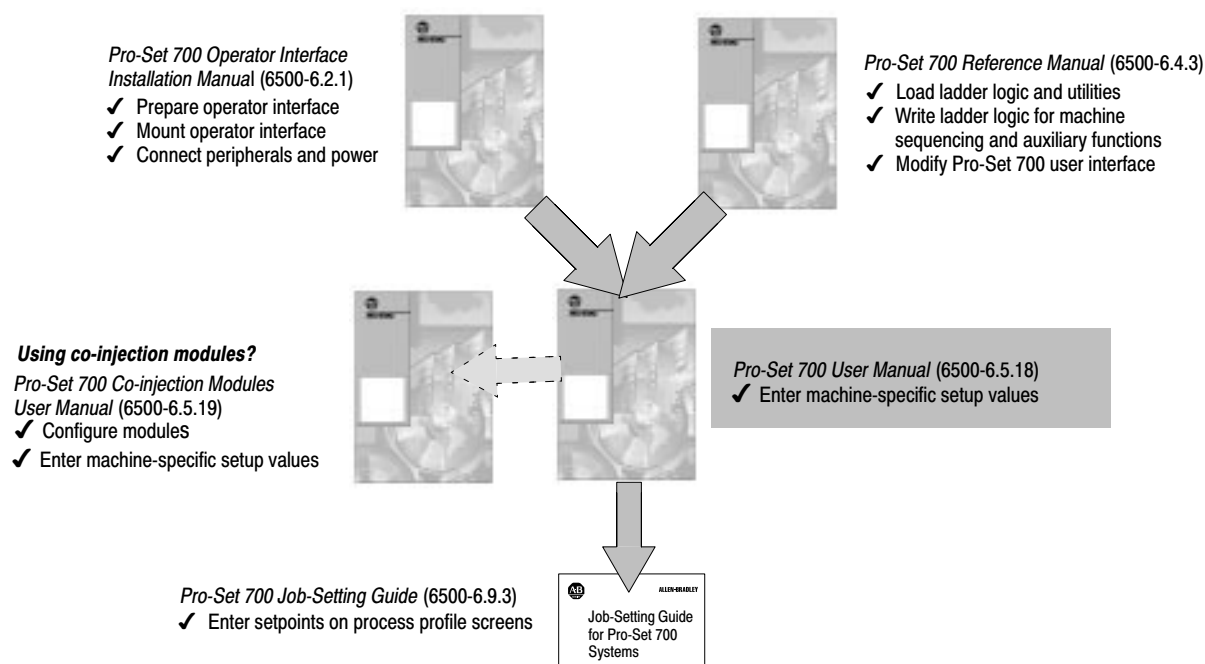
What's in This Preface?

This preface describes how to use this manual as part of the Pro-Set 700 documentation set, including:

- how to use the documentation set
- who should use this manual
- what abbreviations, acronyms, and initialisms are used in this manual
- what conventions are used in this manual
- what other publications are available

How to Use the Documentation Set

Use this documentation to install and use your Pro-Set 700 System.



Who Should Use This Manual?

Use this manual if you are an engineer who designs, builds, and configures plastic molding machinery. You should:

- understand the injection molding process
- be familiar with programmable logic controllers, specifically the Allen-Bradley PLC-5 family of controllers
- be familiar with the QDC injection molding module
- be able to write and interpret the ladder logic instructions required to control your application
- understand the ControlView operating environment

If you do not understand any of these items, contact your local Allen-Bradley representative for more information or available training courses.

What Abbreviations, Acronyms, and Initialisms are Used in This Manual?

Throughout this manual, we use abbreviations, acronyms, and initialisms. Use this table to become familiar with our terminology.

this	stands for
ASCII	American Standards Code for Information Interchange
BTR	block transfer read
BTW	block transfer write
ERC	Expert Response Compensation
F-to-T	false-to-true
I/O	input/output
in/sec	inches per second
LED	light-emitting diode
OEM	original equipment manufacturer
OI	operator interface
PID	proportional-integral-derivative
PLC	programmable logic controller
PSI	pounds per square inch
QDC	Plastic Molding Module (catalog no. 1771-QDC)
SI	system integrator
SPI	Society of the Plastics Industry

What Conventions Are Used in This Manual?

In this manual, we use these conventions:

We call your attention to helpful information like this:



Use the ControlView database editor to edit the database.

We show examples like this:

Example:

This convention presents an example.

We show pathnames, commands, and filenames like this:

/ABPS700/CTK/TSK

We show variable text that you type like this:

filename.tdb

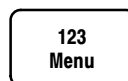
or

FILENAME.TDB

We show buttons that you push like this:



We show screens that you see like this:



We show active menu selections like this:

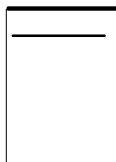
1. Select **Toggle CV Command Line**.

We show references to other Allen-Bradley manuals like this:



This table shows you some other publications you might need if you have other questions about Pro-Set 700 software.

We show references to a chapter within the same manual like this:



Chapter 1 can help you to get started modifying Pro-Set 700 software for your application.

What Other Publications Are Available?

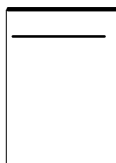


This table shows you some other publications you might need if you have other questions about Pro-Set 700 software.

publication	publication number
Pro-Set 700 Jobsetting Guide	6500-6.9.3
Pro-Set 700 Operator Interface Installation Manual	6500-6.2.1
Pro-Set 700 Reference Manual	6500-6.4.3
Pro-Set 700 User Manual	6500-6.5.18
ControlView Runtime Reference Manual	6195-6.5.4
ControlView Statistical Process Control User Manual	6190-6.5.20
Plastic Molding Module Inject Mode Manual	1771-6.5.85
Plastic Molding Module Inject Mode Manual	1771-6.5.85
Plastic Molding Module Inject and Clamp Mode Manual	1771-6.5.86
Plastic Molding Module Clamp and Eject Mode Manual	1771-6.5.87
Plastic Molding Module Reference Manual	1771-6.6.88
Plastic Molding Module – Inject, Clamp, & Eject Mode User Manual	1771-6.5.93
Pro-Set 700 Co-injection Software User Manual	6500-6.5.19
Temperature Control Module User Manual	1771-6.5.120

Important: This manual is designed to accompany the system as we ship it. The screens in your system may vary a great deal from the screens presented here due to customization by your OEM, remanufacturer, or system integrator.

What's Next?



In Chapter 1, we give you information to quickly set up your system.

Quick Start for the Experienced User

What's in This Chapter?

This chapter can help you to get started using Pro-Set 700 software with your application. Because it is a start-up guide for experienced users, this chapter *does not* contain detailed explanations about the procedures listed. We provide references to other chapters in this book where you can get more information.

This chapter:

- tells you what to do before you begin
- gives a flowchart of procedures you need to follow to use and customize your system
- briefly explains each task
- tells you where to go for more information



If you have any questions or are unfamiliar with the terms used or concepts presented in the procedural steps, *always read the referenced chapters* and other recommended documentation before trying to apply the information.

Before You Begin

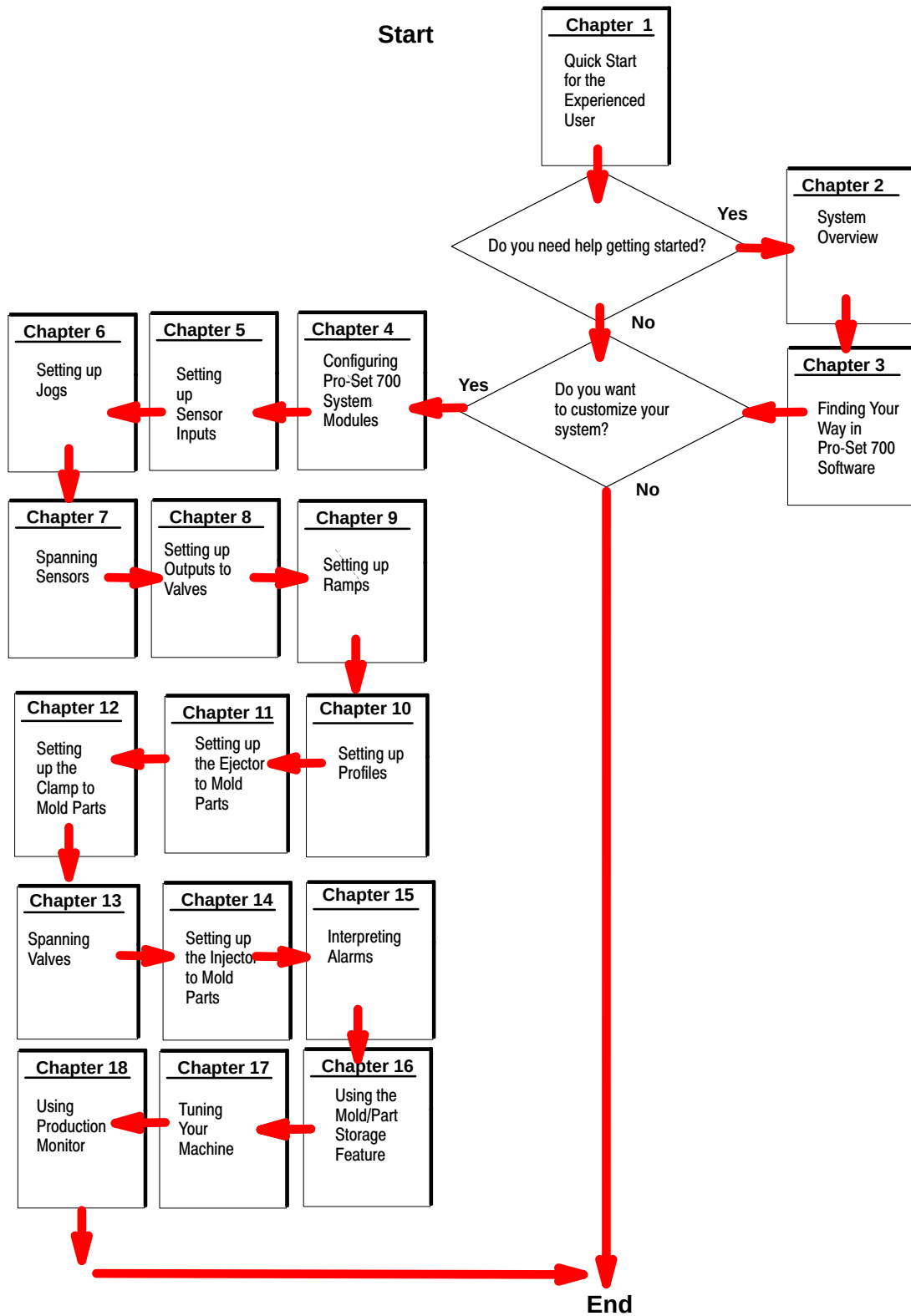
Before you begin, make sure that you understand the following:

- the injection molding process
- programmable logic controllers, specifically the Allen-Bradley PLC-5 family of controllers
- the QDC injection molding module
- how to write and interpret the ladder logic instructions required to control your application
- the ControlView operating environment

If you do not understand any of these items, contact your local Allen-Bradley representative for more information or available training courses.

Understanding the Tasks You Will Perform

The flowchart shows you everything you need to do to use Pro-Set 700 software to customize your system.



Getting Started with Pro-Set 700 Software

To start using Pro-Set 700 software to customize your system, follow the procedures below. For more information, refer to the appropriate chapter in this manual.

✓ Get an Overview of the Pro-Set 700 Injection Molding Control System (Chapter 2)

Read chapter 2 carefully for an explanation of how Pro-Set 700 software controls injection molding machine phases.

✓ Learn Your Way Around Pro-Set 700 Software (Chapter 3)

Start the Software

1. Apply power to the operator interface.
2. Select 1) Run Pro-Set 700.

Use the Keypad

Refer to this section for a description of the keys on the operator interface.

Log on to the System

1. Go to the Accounts screen.

A black rectangular button with the word "Logon" in white text.

2. Press the  key.
3. Use the pop-up keyboard to enter your user name and password.

Log off of the System

1. Go to the Accounts screen.

A black rectangular button with the word "Logoff" in white text.

2. Press the  key.

Change your Password

1. Go to the Accounts screen.

A black square button with the text "Change Password" in white, stacked vertically.

2. Press the key.
3. Enter your current password.
4. Enter your new password.
5. Re-enter your new password.

Use Menus

Refer to this section to use Pro-Set 700 menus.

Use Menu Shortcuts

Refer to this section to use menu shortcuts.

Enter Data

Refer to this section to enter data. You can enter data by:

- typing a value
- selecting from a list
- using a pop-up keyboard

Download Data

When you are finished entering data, download it to the PLC

processor by pressing the  key.

Select a Language

6. Go to the Setup menu.
7. Select the General option.
8. Choose the Select Language selection.
9. From the pop-up menu, choose the desired language.



The basic Pro-Set 200 programming software provides files in the English language only. If you want to use additional languages, you, the system integrator (SI) or the OEM must configure them.

Use On-line Help

1. Move the cursor to the field about which you want more information.



2. For on-line help, press the key.

✓ **Configure Pro-Set 700 System Modules (Chapter 4)**

1. Determine the modules' positions in the I/O chassis.
2. Use the Rack Configuration screen to define system hardware.
3. Select the operating mode.
4. Determine and record I/O ranges.
5. Configure QDC modules.
6. Set up temperature loops.
7. Configure the SPI module.

✓ **Set up Sensor Inputs (Chapter 5)**

Set up the software to accept signals from:

- position sensors
- pressure sensors
- screw RPM sensors

To set up sensor inputs:

1. From the Setup Inputs menu, select any of the pressure, position, or RPM sensors.
2. Enter initial spanning limits from sensor nameplates or specifications.
3. For pressure and RPM sensors, enter alarm setpoints and time delay.
4. Download your selections to the PLC processor.
5. If necessary, set up alarms for pressure sensors.

✓ **Set up Jogs to Define Clamp, Screw, and Ejector Motion (Chapter 6)**

1. Set up jog %-outputs.
2. Write ladder logic to implement jogging.
3. Set up jogs for the injection screw.
4. Set up jogs for the clamp and ejector.

✓ **Span Sensors Through Their Linear Operating Range (Chapter 7)**

Enter minimum and maximum positions for:

- position sensors
- pressure sensors
- screw RPM sensors

Span Position Sensors

1. From the Setup Inputs menu, select Screw Position.
2. Jog the axis to its mechanical stop at minimum (zero) position.
3. Enter a value from the sensor's specifications or nameplate in the Minimum Position field.
4. Read the minimum position signal from the real-time values box.
5. Enter the minimum position value in the Nameplate column of the Analog Signal at Minimum Position field.
6. Re-apply pressure and/or flow so you can jog the axis.
7. Jog the axis to its mechanical stop at maximum position.



ATTENTION: For safety, remove pressure and/or flow to stop the screw from moving along its horizontal axis. Failing to do so could result in personal injury or damage to system hydraulics.

8. Physically measure the distance traveled from the minimum position.
9. Read the maximum position signal from the real-time values box.
10. Enter the maximum position value in the Nameplate column of the Analog Signal at Maximum Position field.
11. Download values to the PLC processor.
12. Install the mold and manually zero the axis (if you use the zero axis function in your application).

Span Pressure Sensors

1. From the Setup Inputs menu, select Screw Pressure.
2. Release pressure until you reach a minimum.
3. Enter the minimum pressure in the Minimum Pressure field.
4. Read the minimum pressure signal from the real-time values box.
5. Enter this signal level in the Analog Signal at Minimum Pressure field.
6. Torque all hydraulic connections and joints before continuing.



ATTENTION: Use extreme caution when you stress the hydraulics to maximum rated pressure. Loose fittings or faulty components could fail, causing possible damage and/or injury.

7. Boost the pressure to a maximum.
8. Read the pressure gauge on the machine.
9. Enter this pressure in the Maximum Pressure field.
10. Read the maximum pressure signal from the real-time values box.
11. Enter this signal level in the Analog Signal at Maximum Pressure field.
12. Use the maximum pressure to set the high pressure alarm setpoint and time delay.
13. Release hydraulic pressure.
14. Download values to the PLC processor.

Span RPM Sensors

1. Confirm that the screw is at rest (not rotating).
2. From the Setup Inputs menu, select Screw RPM.
3. Enter 0000 as the minimum RPM in the Minimum RPM field.
4. Read the RPM signal in the real-time values box.
5. Enter this signal level in the Analog Signal at Minimum RPM field.



ATTENTION: Be sure that any residual plastic in the barrel is hot enough to be in a liquid state before you go on to the next step. Attempting to rotate the screw at maximum RPM with cool plastic in the barrel could damage your barrel and/or screw.

6. Allow full hydraulic flow to your screw motor at rated hydraulic pressure to obtain maximum RPM.
7. Determine the actual RPM by using a calibrated, hand-held touch tachometer (or similar device).
8. Enter this RPM in the Maximum RPM field.
9. Read the RPM signal in the real-time values box.
10. Enter this signal level in the Analog Signal at Maximum RPM field.
11. Release flow and pressure from your screw motor and allow the screw to stop.
12. If you haven't already done so, torque all hydraulic connections and joints before continuing.



ATTENTION: If the screw, clamp, and/or ejectors are not disconnected from the hydraulic circuit, be sure they are blocked at zero position. This forces the cylinders to press against a mechanically blocked obstacle and builds maximum pressure. If you do not mechanically block the cylinders, they could suddenly move, causing possible personal injury or equipment damage.

13. Mechanically block the hydraulic cylinders.



ATTENTION: Use extreme caution when you stress the hydraulics to maximum rated pressure. Loose fittings or faulty components could fail, causing possible damage and/or injury.

14. Boost system pressure to a maximum.
15. Read the system pressure gauge.
16. Record the maximum pressure.
17. Read the pressure signal in the real-time status box.
18. Use the maximum pressure to set the high RPM alarm setpoint and time delay.
19. Download values to the PLC processor.

✓ Set up Outputs to Valves (Chapter 8)

Set up outputs to hydraulic valves during each phase of machine operation.

1. Review the QDC module outputs you defined in chapter 4.
2. Identify the QDC module output to the selected control valve.
3. If necessary, span pressure valves for less than maximum rating.
4. Define %-outputs during machine phases.

✓ Set up Ramps (Chapter 9)

Use ramps to smooth out erratic motion resulting from quick increases in pressure or flow.

To set up ramps with the set-output function:

1. Enter fixed %-outputs into these data table addresses:

for these outputs	with this number of QDC modules	enter fixed %-outputs into these data table addresses
V1 - V4	one	N40:121 - 124
V1 - V8	two	N40:121 - 128

2. Command the set-output function by using ladder logic to set the set-output bit B34:24/08 to true (on).
3. Select the ramps screen you want to modify.

To set up ramps for process profiles:

1. Select the Setup Ramps screen for each process profile.
2. Enter ramp rates on the appropriate screens.

✓ Set up Profiles (Chapter 10)

Enter values to control the action of the injector, clamp, and ejector.

1. On the appropriate Profile screen, move the cursor to the data entry fields and enter values as described in this chapter.
2. Move the cursor to the selection fields and select from the choices described in this chapter.

✓ **Span Valves (Chapter 11)**

Adjust your machine's pressure and velocity valves to match the QDC module output signal range.

Span Pressure Valves

1. Access the Setup Clamp/Eject or Screw Jogs screen, depending on the machine phase of the pressure valve you want to span.
2. Enter the %-output corresponding to the high end of the valve's operating range.
3. Prepare the machine for jogging.
4. Hold the jog button and adjust the machine's maximum potentiometer to the desired high-end pressure. Read the pressure from the machine's pressure gauge. Release the jog button when you are finished.
5. Enter the %-output corresponding to a typical low end of the valve's operating range.
6. Hold the jog button and adjust the machine's minimum potentiometer to the desired high-end pressure. Read the pressure from the machine's pressure gauge. Release the jog button when you are finished.
7. Repeat steps 2 through 6 until the valve delivers the desired pressure corresponding to the QDC module's output range.

Span Velocity Valves



Before you begin this procedure, make sure that the control mode is velocity vs. position.

1. Access the Setup Valves screen.
2. For the high end of the valve curve, enter a value of 99.99% in the Maximum %-output field for the velocity valve.
3. Enter a value of 99.9 in/sec in the Maximum Limit field for the velocity valve.
4. Go to the Injection Profile screen.
5. Enter end-position setpoints.
6. Enter velocity setpoints of 99.9 in/sec or 99.9%.



ATTENTION: Hot plastic can splatter and cause burns. Disable machine movement to guard against injury.

7. For steps 7 through 11, shoot hot plastic into the air.
8. Run the profile and read velocity actuals returned from the QDC module.
9. The highest velocity actual is the spanning value for Maximum Limit. Write this value here _____.
10. Decrease all velocity setpoint in 5% increments and run a machine phase for each change until velocity actuals start to decrease.
11. Find the place on the valve curve where velocity actuals no longer increase with a change in setpoint by increasing all velocity setpoints in 1% or 2% increments. This point is the “knee” in the valve curve.
12. Average the actuals and record the velocity setpoint. Write the setpoint here _____.
13. Now do this procedure for the low end of the valve curve. Enter velocity setpoints of 0% or 0 in/sec.
14. The lowest velocity actual is the spanning value (typically zero) for Minimum Limit. If this value is something other than zero, write it here _____.
15. Increase all velocity setpoints in 5% increments and run a machine phase for each change until velocity actuals just start to show movement.
16. Find the place on the valve curve where velocity actuals no longer decrease with a change in setpoint by decreasing all velocity setpoints in 1% or 2% increments. This point is the “knee” in the valve curve.
17. Average the actuals and record the velocity setpoint. Write the setpoint here _____.

18. Access the setup valves screen and enter these actuals as spanning values:

in this field	enter this actual
Maximum Limit	maximum velocity
Maximum %-output ¹	knee velocity
Minimum Limit	minimum velocity of zero
Minimum %-output ¹	knee velocity

¹ If your velocity units are in/sec, enter the value as if it were a percentage with a decimal point. For example, enter 87.6 in/sec as 87.6%.

19. For bi-directional valves, enter maximum and minimum %-output values as shown in the following table.

for bi-directional valves that are	divide the knee value in half, and	enter it in this field
forward-acting	add it to 50%	Maximum %-output
reverse-acting	subtract it from 50%	Maximum %-output
forward-acting	add it to 50%	Minimum %-output
reverse-acting	subtract it from 50%	Minimum %-output

20. Download your selections to the PLC processor.



To span velocity valves for the clamp and/or ejector, use the same procedure as described above.

✓ **Set up the Clamp to Mold Parts (Chapter 12)**

Follow these steps to set up clamp profiles.

1. Access the appropriate Setup Profile screen.
2. Enter values in the appropriate fields. Refer to the table in this chapter for values to enter.
3. Download your selections to the PLC processor.

✓ **Set up the Ejector to Mold Parts (Chapter 13)**

Follow these steps to set up eject profiles.

1. Access the appropriate Setup Profile screen.
2. Enter values in the appropriate fields. Refer to the table in this chapter for values to enter.
3. Download your selections to the PLC processor.

✓ **Set up the Injector to Mold Parts (Chapter 14)**

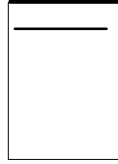
Follow these steps to set up injection profiles.

1. Access the appropriate Setup Profile screen.
2. Enter values in the appropriate fields. Refer to the table in this chapter for values to enter.
3. Download your selections to the PLC processor.

✓ Interpret Alarms (Chapter 15)

Acknowledge Alarms

1. Observe the alarm code that appears on the banner of the screen.
2. Refer to the listing of pre-configured alarms in this manual to determine if the alarm is one supplied at the factory.



Your OEM or system integrator (SI) may have added custom alarms for you. These alarm codes are not listed in Pro-Set 700 documentation. The OEM or SI may have added on-line help text so you can troubleshoot the alarms. See your OEM or SI for more information.

if the alarm is	do this
pre-configured (supplied at the factory)	refer to the listing of pre-configured alarms in this manual for a description of the alarm, or move the cursor to the selected alarm and press the help key.
added by an OEM or system integrator	see your OEM or SI for details

3. Correct the alarm condition.

Acknowledging Messages

1. Observe the message that appears on the banner of the screen.



No messages are supplied at the factory. Your OEM or SI may have added messages for you. These messages are not listed in Pro-Set 700 documentation. The OEM or SI may have added on-line help text so you can troubleshoot the system. See your OEM or SI for more information.

2. Correct the condition that caused the message.

✓ Use the Mold/Part Storage Feature (Chapter 16)

Save a File

1. Press  to go to the Mold/Part Storage screen.
2. From the Mold/Part Storage screen, press .
3. Press  /  or  to move the cursor to an * Unused * item line.
4. Press  to save the file. The setup is transferred from PLC memory to operator interface storage in the designated file.

Restore a File

1. Press  to go to the Mold/Part Storage screen.
2. From the Mold/Part Storage screen, press .
3. Press  /  or  to move the cursor to the item line listing the mold/part file you want to restore.
4. Press .
5. When the confirmation window appears, select START and press .

Entering a New Name or Description

1. Press  to go to the Mold/Part Storage screen.
2. From the Mold/Part Storage screen, press .
3. Press  or  or  or  to move the cursor to the item line listing the name/description you want to change.
4. Press:
 -  or  to change/enter a name
 -  or  to change/enter a description
5. Enter the new name or description in the alphabet window that appears and press .
6. The alphabet window disappears. The new name/description appears on the item line.

Cut, Copy, and Paste a File

1. Press  to go to the Mold/Part Storage screen.
2. From the Mold/Part Storage screen, press .
3. Press  or  or  or  to move the cursor to the item line listing the file you want to cut or copy.

4. Press:



- to delete the file. A confirmation window appears.



Select Yes or No and press . If you selected YES, the file is deleted, but is saved in the paste buffer.



- to make a copy of the file in the paste buffer. Clear the message window that appears and move the cursor to a new item line. Then paste the file.



- to paste file to another item line. Move cursor to line where you want to paste file and press the Paste key. A confirmation window appears. Select Yes or No and press

**Compare and Export a File**

1. Access the Mold/Part Storage screen.



2. From the Mold/Part Storage screen, press .



3. Press or to move the cursor to the item line listing the file you want to compare or export.

4. Press:



- to compare a stored file with the active file. Clear the message window that appears.



- to export a file. Clear the message window that appears.

5. To view the contents of the compared or exported file press



or



.

✓ Tune your Machine (Chapter 17)

Optimize machine performance by adjusting PID pressure and velocity loops.

Tune PID Pressure Loops

Important: Each time you change a gain constant, you must download the change to the QDC module.

1. On the appropriate Process Profile screen, select Pressure vs. Position and Closed-loop Control.



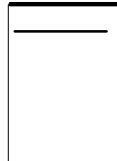
If zone overrun occurs, execute a low-pressure close.

2. On the appropriate Process Profile screen, enter pressure setpoints that represent the characteristics you desire for your production cycle.
3. Download the change to the QDC module.
4. On the appropriate Process Profile screen, zero the profile's integral and derivative terms. Set the proportional term to a value you select.
5. Download the change to the QDC module.
6. Run several profile cycles while comparing actuals with setpoints.

Tune PID Velocity Loops

Important: Each time you change a gain constant, you must download the change to the QDC module.

1. On the appropriate Process profile screen, select Velocity vs. Position and Closed-loop Control.
2. On the appropriate Process profile screen, enter velocity setpoints that represent the characteristics you desire for your production cycle.
3. Download the change to the QDC module.
4. On the appropriate Process Profile screen, zero the Velocity Feedforward gain (VelFF). Set the proportional term to a value you select.
5. Download the change to the QDC module.
6. Run several profile cycles while comparing actuals with setpoints.



Refer to the chart in chapter 16 for suggestions on adjusting the proportional term. Download changes to the QDC module.

7. Re-run the profile after each change to the proportional term until:
 - observed actuals are close to setpoints
 - oscilloscope traces quickly level off without bounce or chatter
 - hammering and vibration in hydraulic lines has stopped

If none of the above happens, verify that:

- the unselected valve %-output values are correct for your application
- pump adders are working correctly



If you are satisfied with your unselected valve %-outputs and still cannot match velocity actuals to desired setpoints, your velocity profile may require a small feedforward gain. So that the feedforward gain is properly calculated, do not enable ERC.

8. If necessary, slowly increase the feedforward term while running machine cycles until velocity actuals match setpoints.

✓ Use the Production Monitor Screen (Chapter 18)

Use the Production Monitor screen to set up and monitor production data, such as ideal cycle times and total parts required.

Enter Data



Before you use the Production Monitor screen, make sure that ladder logic is present to control these bits:

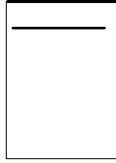
this bit	is set to true (on) when
B23/44	the injection molding machine's main motors are on
B23/45	a machine cycle begins to increment the parts scrapped counter

1. Log on to the correct security level.
2. On the Production Monitor screen, move the cursor to the field containing the value you want to change.
3. Enter values in the appropriate fields.
4. Download your selections to the PLC processor.

Monitor Data

Read the data you want to monitor. See chapter 15 for a listing of the data the Production Monitor reports.

What's Next?



In Chapter 2, we explain the Pro-Set 700 system's operation.

System Overview

What's in This Chapter?

This chapter presents an overview of the Pro-Set 700 Injection Molding Control System. Read this chapter before you set up molding profiles, so that you are familiar with:

- molding control system components
- the injection molding process
- controlling the molding process with the QDC module

What Does Pro-Set 700 Software Do?

Pro-Set 700 software:

- lets you control and monitor the injection molding process
- lets you set up the control system to match your machine
- provides communication between the Operator Interface, QDC modules, and PLC-processor

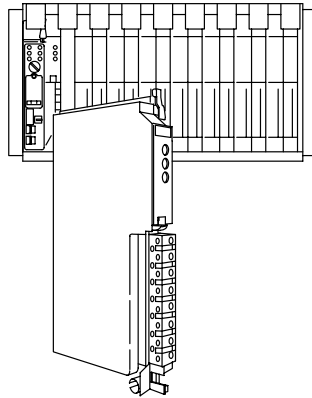


You can customize this software by modifying screen displays and ladder logic to meet specific requirements. Refer to the Pro-Set 700 Reference Manual, publication 6500-6.4.3 for more information.

What Are the Components of a Molding Control System?

To create an automated molding control system, you need the components shown below. Pro-Set 700 software, used with these components, lets you create profiles to control the plastic molding process. This system also provides production flexibility and reporting capabilities.

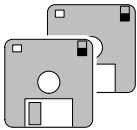
Plastic Molding modules (QDC) controls the clamp, inject, and/or ejector movements of the plastic molding machine. The QDC module interfaces with machine sensors and solenoid valves independent of the PLC-5 processor.



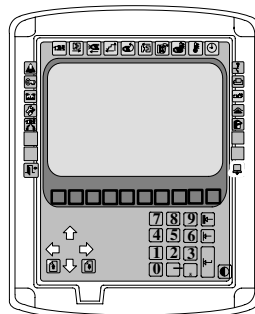
1771 I/O chassis/power supply contains the PLC-5 processor, QDC module, and additional I/O modules.

PLC-5 processor coordinates sequential machine control with the automatic operation of the QDC module.

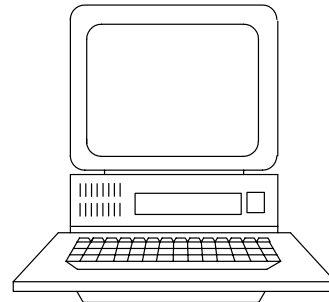
Optional discrete and analog I/O modules interface with barrel temperatures, limit switches, push buttons, pump adders, and other machine inputs and outputs as needed.



Pro-Set 700 software includes ladder logic to control system operation, as well as text files to customize screens for your application.



Pro-Set 700 Operator Interface lets an operator enter data and monitor system operation with pre-loaded system software.

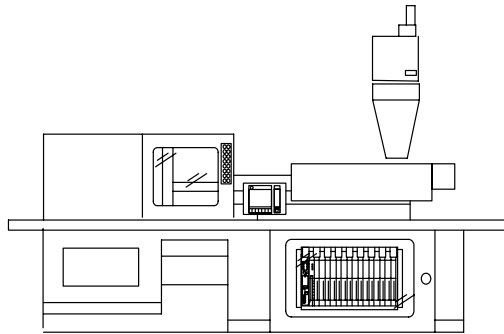


Programming terminal lets you enter ladder logic and data into data storage areas of the PLC-5 processor.

What Do I Need to Do?

As an Allen-Bradley injection molding customer, you:

- provide the injection molding machine and its hydraulics

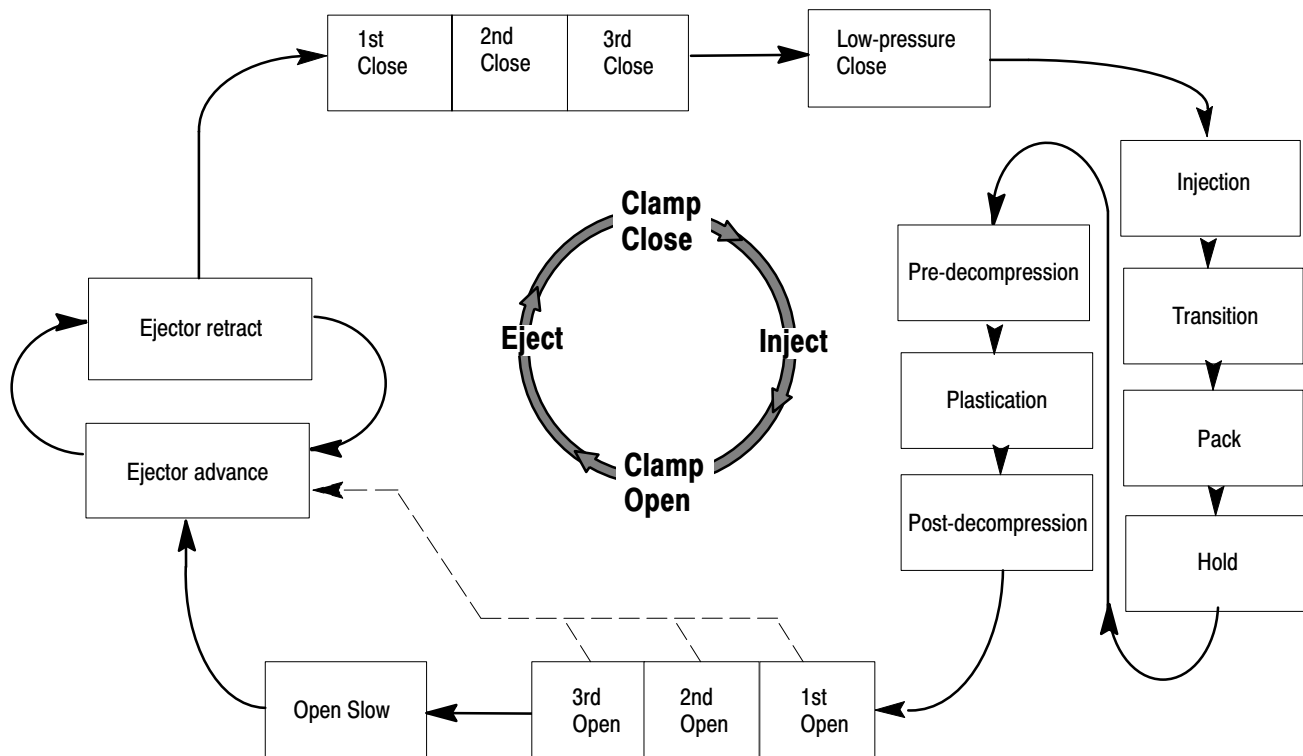


- develop ladder logic that:
 - controls sequential machine operation not included in Pro-Set 700 software
 - sends commands to the QDC module
 - handles permissives
 - responds to hard-wired safeties and E-stops
- determine profile setpoints, process limits, and other application-specific parameters used by the QDC module to control your injection molding process
- comply with ANSI B151.1-1984 safety standards

What is the Injection Molding Process?

To properly set up molding profiles, you must understand the injection molding process. This diagram helps you to understand the four main phases of the injection molding process:

- inject
- clamp open
- eject
- clamp close

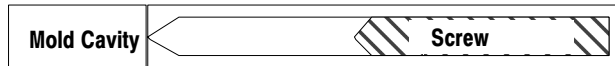


Inject

During the inject phase, the injection screw advances to shoot hot resin into the mold cavity, pressurizes it to fill any voids, and holds pressure as the part cools.

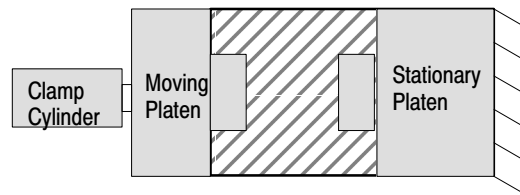


The injection screw backs up to reload pellets of resin for the next shot. During reloading, the screw mechanism rotates to grind the pellets. The friction generated helps to melt the pellets. We call this *plastication*. The distance the injection screw moves is the *shot length*.



Clamp Open

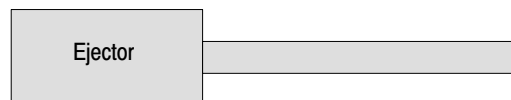
During the clamp open phase, the clamping cylinder pulls the moving platen from the stationary platen to open the mold.



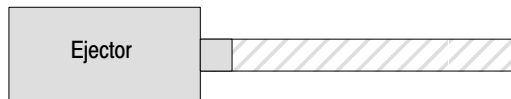
Eject

During the eject part of the operation, the ejector in the molding machine:

advances to eject the part from the mold, and

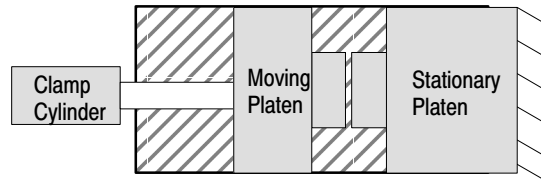


retracts out of the way



Clamp Close

During the clamp close phase, the clamping cylinder pushes the moving platen toward the stationary platen to close the mold.



How is the Injection Molding Process Controlled?

The 1771-QDC Plastic Molding module lets you solve complex molding problems by controlling each phase of the injection molding process.

With Pro-Set 700 software screens, you can select velocity or pressure control. You vary the velocity or pressure of the injection screw, clamp, or ejector to achieve quality parts with rapid machine cycles.

You can select the QDC module operation mode, and use the module alone or in pairs to control these machine phase combinations:

the QDC module(s), alone or paired, in this operating mode	controls these phases
Inject	Injection, Pack, Hold, Decompression, Plastication
Inject-Clamp	Injection, Pack, Hold, Plastication, Clamp Close, and Clamp Open
Clamp-Eject	Clamp Close, Clamp Open, Ejector Advance, Ejector Retract
Inject-Clamp-Eject	all of the above

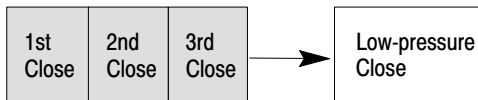
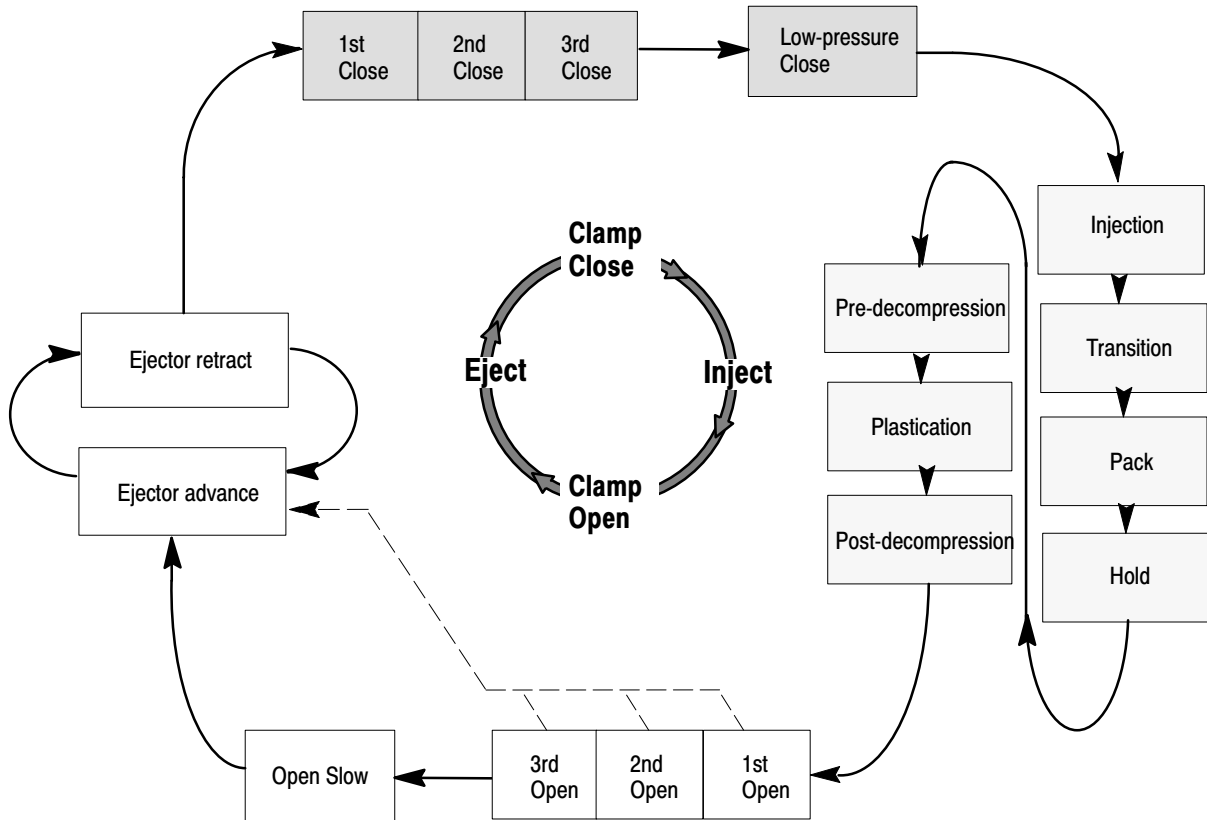
Let's take a closer look at each of the phases in the order they occur in the machine cycle, and discuss how you can control each phase by using profiles.



You can also use co-injection modules (1771-QI) to control complex injection cycles with multiple injection heads. Refer to the Pro-Set 700 Co-injection Software User Manual, publication 6500-6.5.19, for more information.

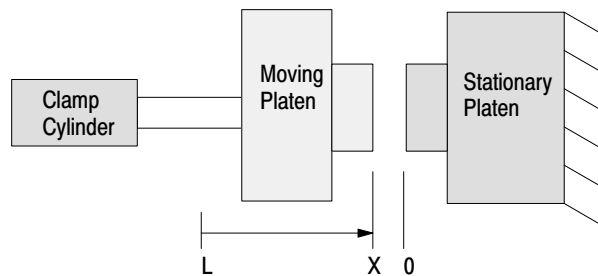
Clamp Close

During clamp close, the mold closes.

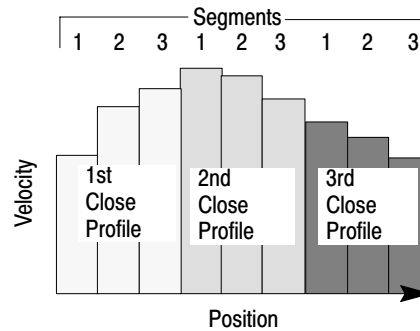


1st, 2nd, 3rd Close

During clamp close, the moving platen advances at a relatively high velocity or pressure (depending on whether you've chosen velocity or pressure control) from the fully open position (L) to position X. Position X is relatively close to the stationary platen, but far enough away to allow deceleration into low-pressure close. The low-pressure close prevents the platens from coming together at a high velocity.



To control the moving platen, you can define as many as three close profiles. Each of the three profiles is divided into three position segments. This means you can change the clamp velocity or pressure a maximum of three times in each profile (or nine times for the entire clamp close).



After the last segment in each profile is complete, the QDC module:

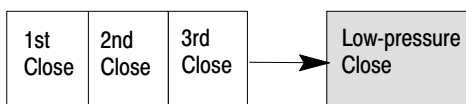
- switches immediately to the next programmed segment of the next profile, or
- waits for a PLC processor command to continue

After completing the last configured close profile, the QDC module:

- switches immediately to the first programmed segment of low pressure close, or
- waits for a PLC processor command to continue



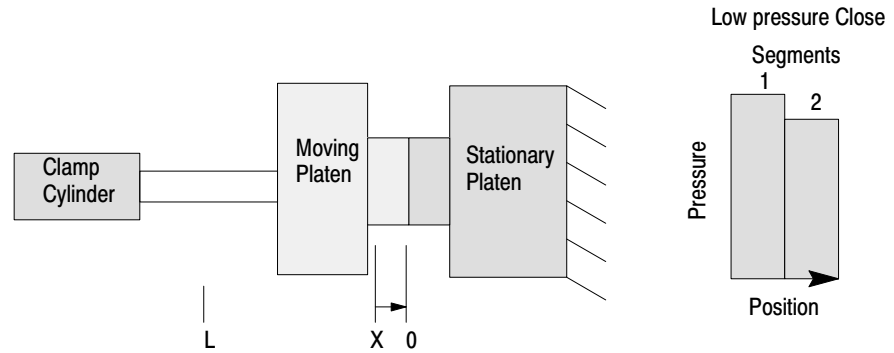
You can use as many or as few profiles and/or segments as needed for your molding application.



Low-pressure Close

To reduce damage to the mold, use the low-pressure close profile to decelerate the closing motion of the platens. Select a low-pressure close setpoint that keeps the mold from fully closing if there is an obstruction. You can configure as many as two low pressure close segments.

Important: You must use the pressure vs. position control mode for low-pressure close.



Important: If you need only one low-pressure close segment, configure the first segment.

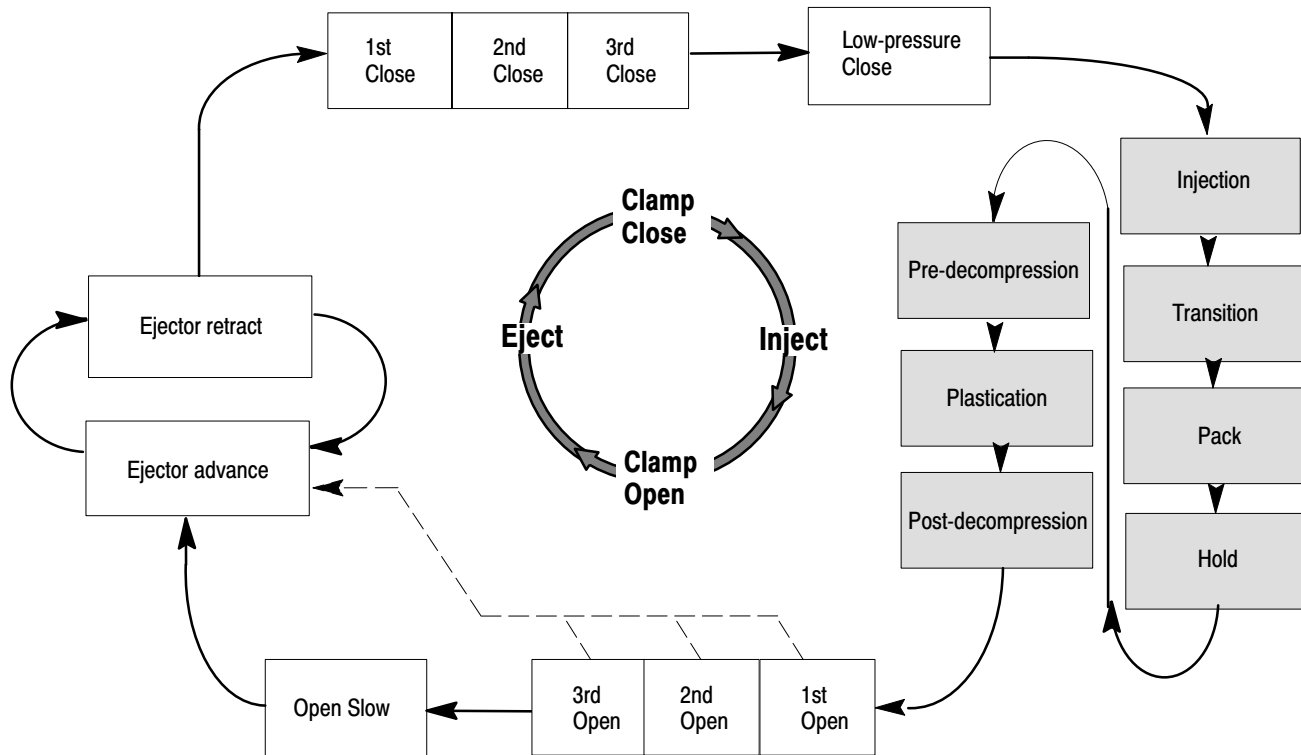
The QDC module notifies your PLC processor when this profile is complete and automatically sets its outputs to pre-determined levels (%-outputs) to:

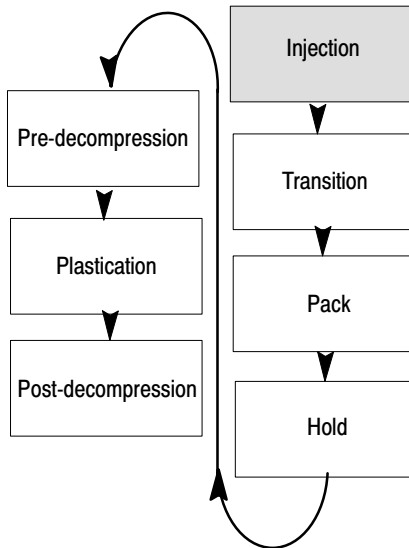
- build tonnage on a hydraulic machine, or
- lock up the toggle on a toggle machine

To reduce damage to the mold when the two mold surfaces meet, and to detect obstructions, close the mold slowly with low pressure in closed-loop or open-loop control. You must use pressure vs. position control.

Inject Phase

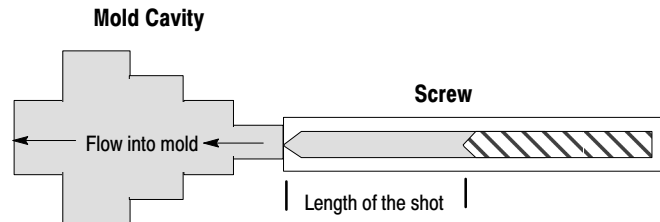
During the inject phase, the screw injects molten resin into the mold, pressurizes it to fill voids, and reloads the barrel with resin for the next shot. This diagram shows the several steps of the inject process.





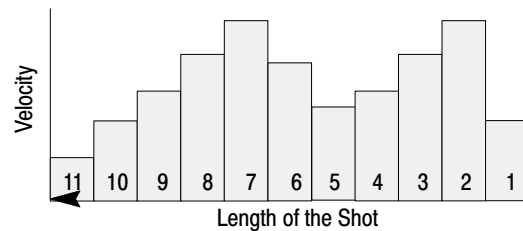
Injection

During injection, the screw injects molten plastic resin (melt) into the mold cavity. The screw should force the melt through the mold cavity as fast as possible without causing *flash* (excess plastic on the edges of the part) or burning the plastic as it goes through the mold gates.

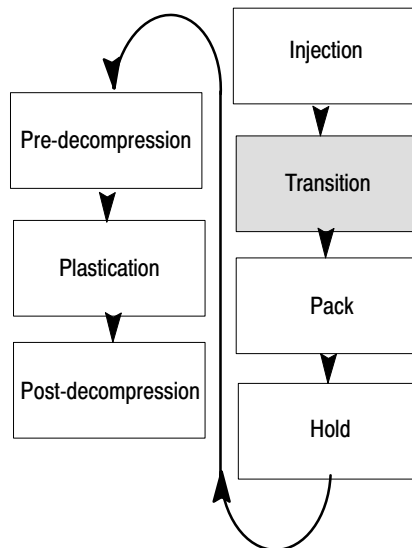


To control this process, you can vary the velocity or pressure of the injection screw with an injection profile, as shown in the illustration below. The table that follows the illustration describes the injection profiles that you can select.

Injection Profile



with this profile	you control injection	with over 11 segments distributed over the
Velocity vs. Position	speed	length of the shot
Pressure-limited Velocity vs. Position	speed (with a ceiling pressure)	length of the shot
Pressure vs. Position	pressure	length of the shot
Pressure vs. time	pressure	duration of the shot
	If pressure exceeds a preset limit, the QDC module switches to PID loop pressure control with the pressure limit as the setpoint. If the velocity exceeds the velocity setpoint, the QDC module returns to velocity vs. position control	



Transition

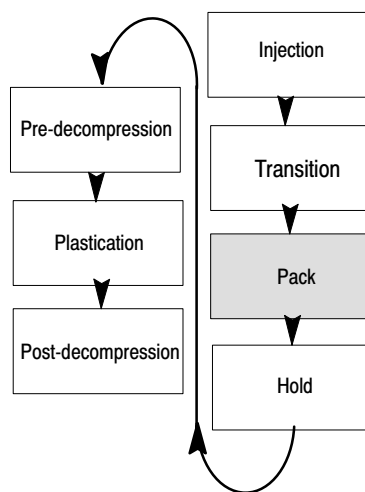
The QDC module ends the injection phase and automatically starts the pack or hold profile when it detects the first of four events:

- screw position reaches a preset limit
- screw pressure exceeds a preset limit
- cavity pressure exceeds a preset limit
- elapsed time exceeds a preset limit

To select the event that you want to monitor for transition, enter either:

- the appropriate setpoint, or
- zero to ignore the event

Important: You can inhibit pressure transitions over the early portion of the shot size to guard against a premature pressure transition.



Pack (optional)

The pack phase lets the molding machine finish packing melt into the mold by filling any voids left after the injection phase.

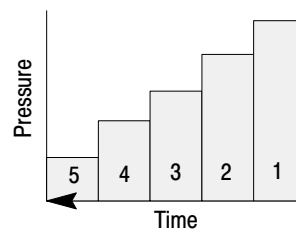
If you decrease the pack pressure over time, some plastic can back out of the mold to help equalize the density throughout the molded part.

The QDC module controls the pack phase with a pressure vs. time profile. You can control either:

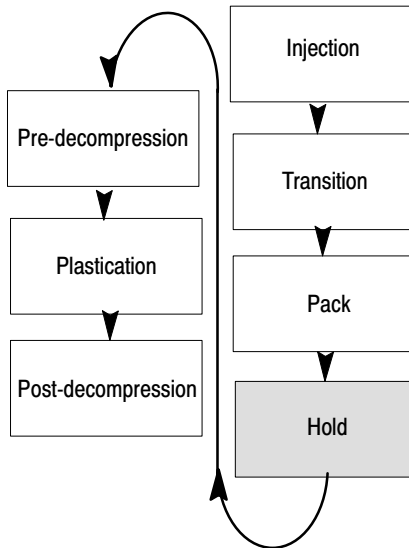
- the hydraulic pressure against the screw, or
- the pressure within the mold cavity that results from the hydraulic pressure against the screw

This diagram shows a pack profile in which the pressure decreases over time.

Pack Profile



After the last segment of the pack phase is completed, the QDC module automatically starts the hold phase.



Hold

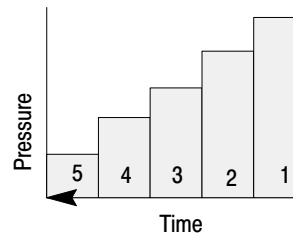
Holding lets the part cool and shrink slightly from the mold cavity in preparation for ejection. The effect is similar to packing. You can hold at predetermined pressures and times throughout the hold phase.

The QDC module controls the hold phase with a pressure vs. time profile. You can control either:

- the hydraulic pressure against the screw, or
- the pressure within the mold cavity that results from the hydraulic pressure against the screw

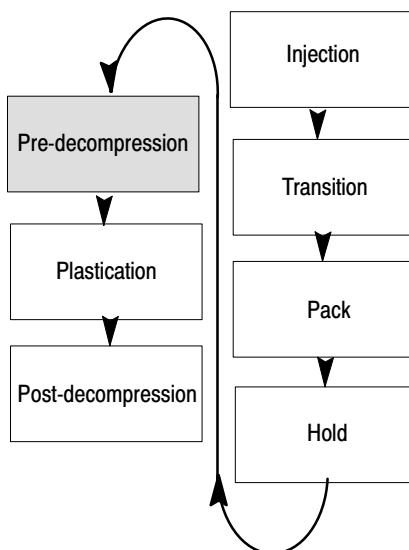
This diagram shows a hold profile in which the pressure decreases over time.

Hold Profile



After the last segment of the pack phase is completed, the QDC module automatically:

- starts the optional pre-decompression movement
- skips the pre-decompression movement if none is required, and
- immediately starts the plastication phase, or
- waits for a PLC processor command to continue



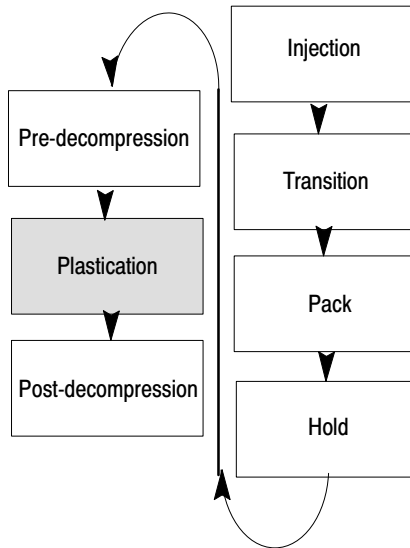
Pre-decompression *(optional)*

This single backward movement of the screw separates the melt solidifying in the mold from the molten cushion remaining in the barrel prior to plastication. This phase is also referred to as *sprue break* or *suckback*.

You determine the length of pre-decompression pull-back for the screw to separate the melt solidifying in the mold from the molten cushion remaining in the barrel.

After pre-decompression is completed, the QDC module either:

- immediately starts the plastication phase, or
- waits for a command from your PLC processor to continue.



Plastication

During plastication, the molding machine reloads by drawing plastic beads into the barrel containing the screw. The mechanical action of the rotating screw grinds and melts the beads. The higher the backpressure or screw RPM during plastication, the higher the resultant temperature of the melt.

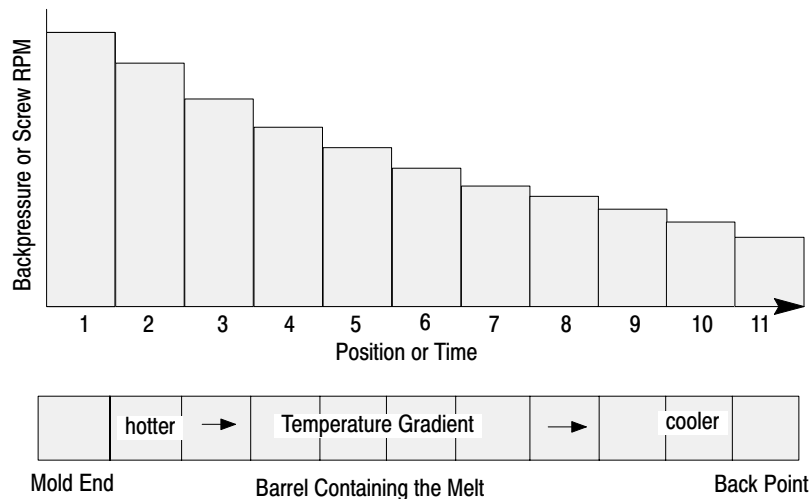
You can vary the backpressure or RPM on the screw to create the desired temperature gradient along the length of the shot.

to	do this
accelerate the backup rate	decrease backpressure or increase screw RPM
increase the resulting melt temperature	increase backpressure or screw RPM

Important: You can control and monitor screw RPM only when you configure the QDC module for the singular inject mode.

Use plastication profiles to achieve a melt temperature gradient with respect to the distance of the molten plastic along the length of the shot. You can control the melt temperature by using one of these plastication profiles:

- backpressure vs. position
- backpressure vs. time
- screw RPM vs. position
- screw RPM vs. time

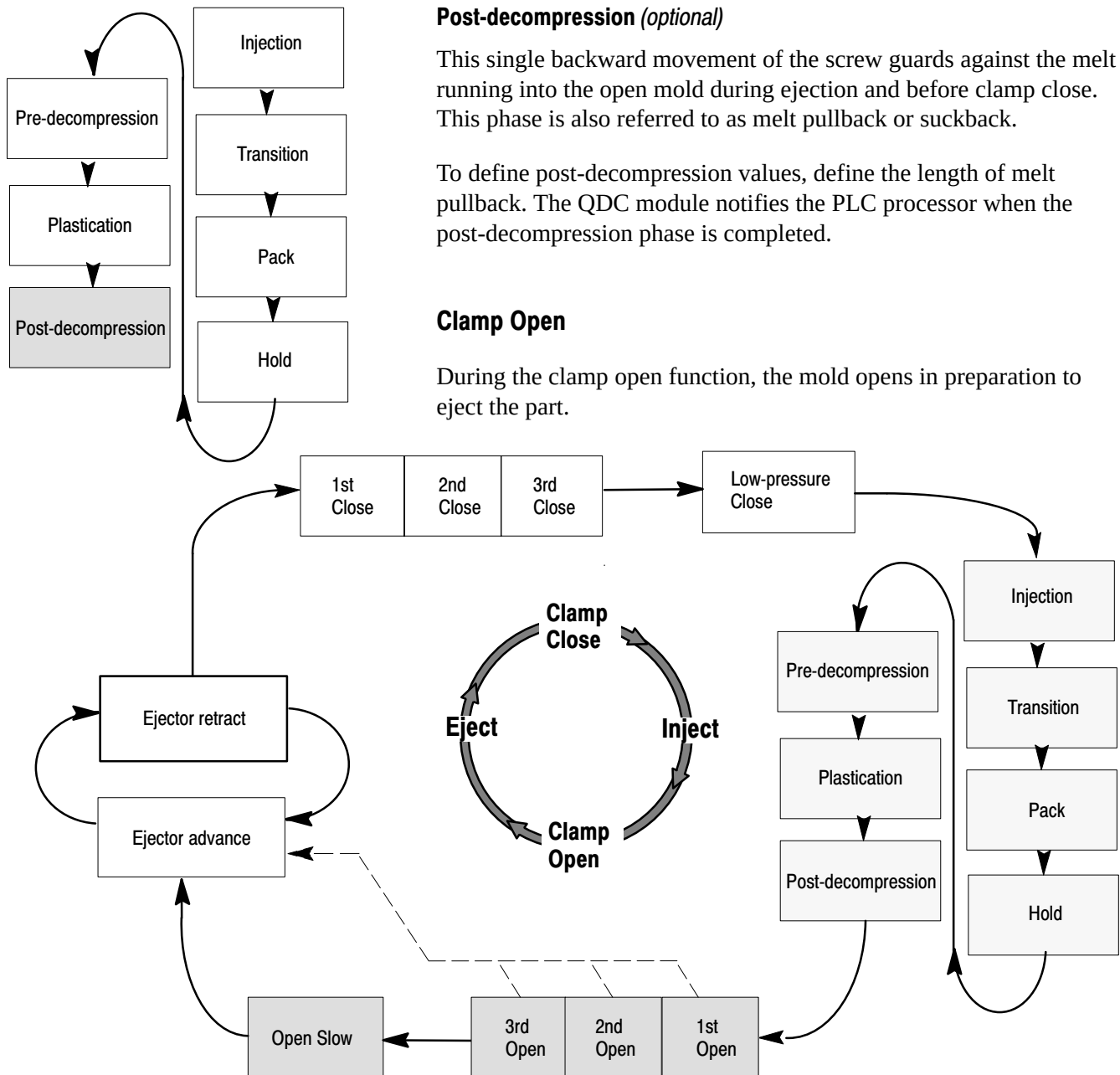


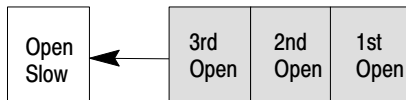
- immediately starts the post-decompression phase, or
- waits for a command from the PLC processor before continuing.

This single backward movement of the screw guards against the melt running into the open mold during ejection and before clamp close. This phase is also referred to as melt pullback or suckback.

Clamp Open

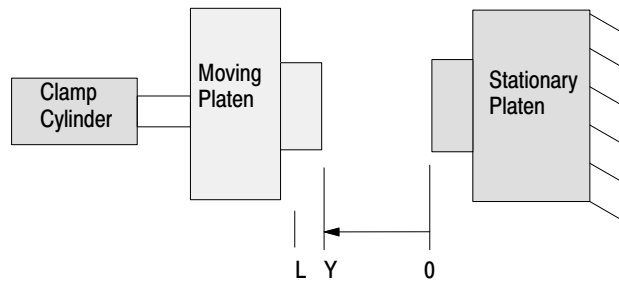
During the clamp open function, the mold opens in preparation to eject the part.





1st, 2nd, and 3rd Open

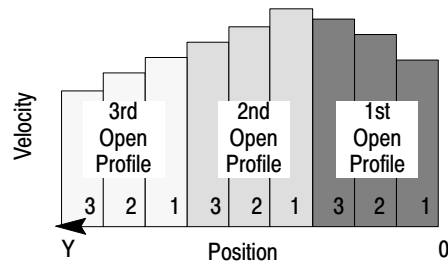
During clamp open, the clamp cylinder moves the platen from the fully closed position (0) to some position Y at a relatively high velocity or pressure. Y is a position close to the fully open position (L) yet far enough away to allow deceleration into the open slow phase. This increases the positioning accuracy at the fully open position (L).



You can specify as many as three clamp open profiles that let you:

- add a third mold plate
- pull cores
- add or remove pumps to change machine speed or pressure
- stop for a part retrieval device, then finish opening
- start the ejector before the mold is fully open

Each clamp open profile is subdivided into three position segments.



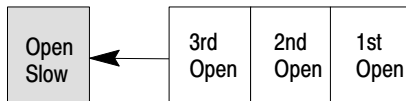
Important: If you are using a single open motion, use the first segment of the first open profile, followed by the open slow profile.

After the last segment in each profile is completed, the QDC module either:

- switches to the next programmed segment of the next programmed profile, or
- waits for a command from your PLC processor to continue

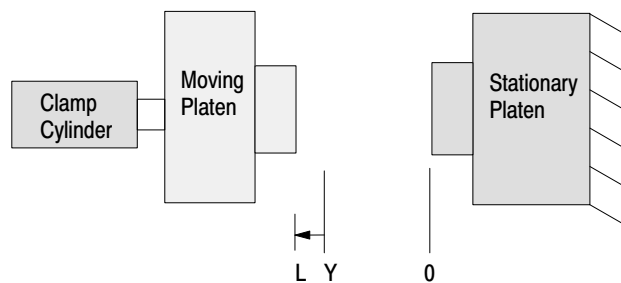
After the last configured clamp open profile is completed, the QDC module either:

- switches immediately to the first programmed segment of the open slow phase, or
- waits for a command from your PLC processor to continue.



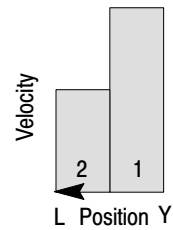
Open Slow

During open slow, the moving platen retracts from position Y to the fully open position L.



You can specify as many as two position segments in the open slow profile, and select either velocity or pressure control.

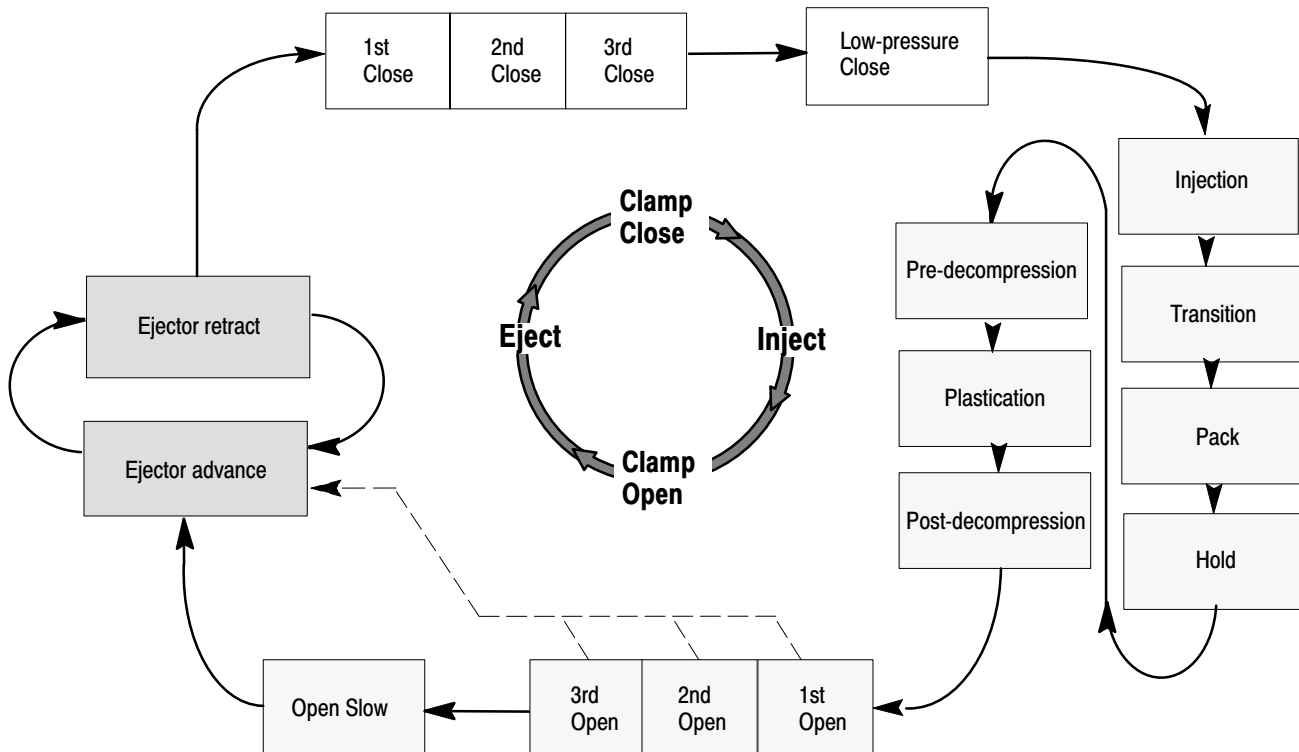
Open Slow Profile

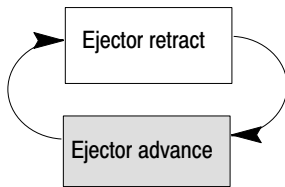


Important: If you need only one open slow motion, configure only the first segment of the open slow profile.

Eject

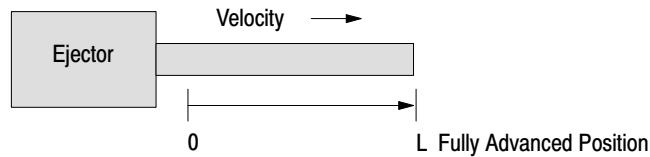
During the eject phase, the part is expelled from the mold. You can advance and retract the ejector in a single step or in multiple steps by using closed-loop or open-loop control.





Ejector Advance

During ejector advance, the ejector moves toward a configured position to eject the part from the mold.

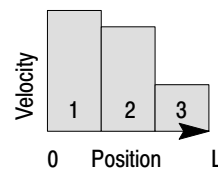


You can choose to advance the ejector while the clamp is still opening the mold or wait until the mold is fully open. The QDC module starts advancing the ejector after detecting either of these events:

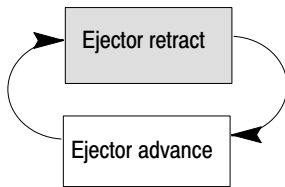
- the clamp position reaches a pre-determined setpoint, or
- the QDC module receives a command from the PLC processor

Use an ejector advance profile to control the position of the ejector with either velocity or pressure control.

Ejector Advance Profile

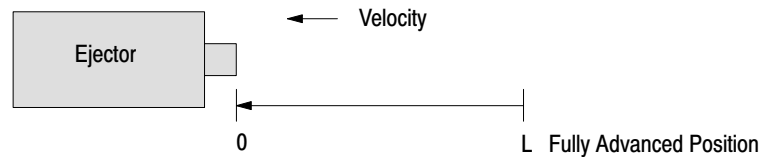


Important: If you need only one ejector advance motion, configure only the first advance segment.



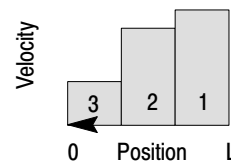
Ejector Retract

After the ejector advances, it retracts.



Use an ejector advance profile to control the position of the ejector with either velocity or pressure control.

Ejector Retract Profile



Other Eject Features

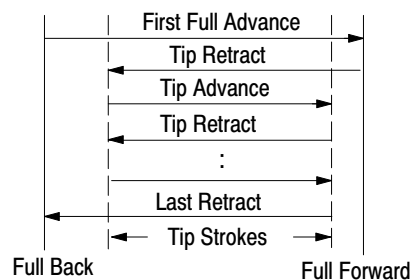
The QDC module lets you:

- repeat ejector cycles automatically or with a command from your PLC processor
- use an ejector forward dwell timer to pause the machine after completing the first or last (but not both) ejector advance stroke

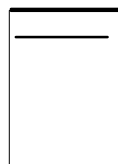
This feature lets a robot pick off a part when the ejectors are fully extended.

- use ejector tip strokes to shake the part off the ejector

You can program interim single-segment advance and retract tip strokes that occur after the first advance stroke and before the last retract stroke.



What's Next?



In Chapter 3, you learn your way around Pro-Set 700 software.

Finding Your Way in Pro-Set 700 Software

What's in This Chapter?

As you set up your injection molding machine with Pro-Set 700 software, you enter setpoints and make selections to define process characteristics. This chapter describes how to find your way in the software.

Read this chapter to learn how to:

- use the menus
- enter information
- use the operator interface

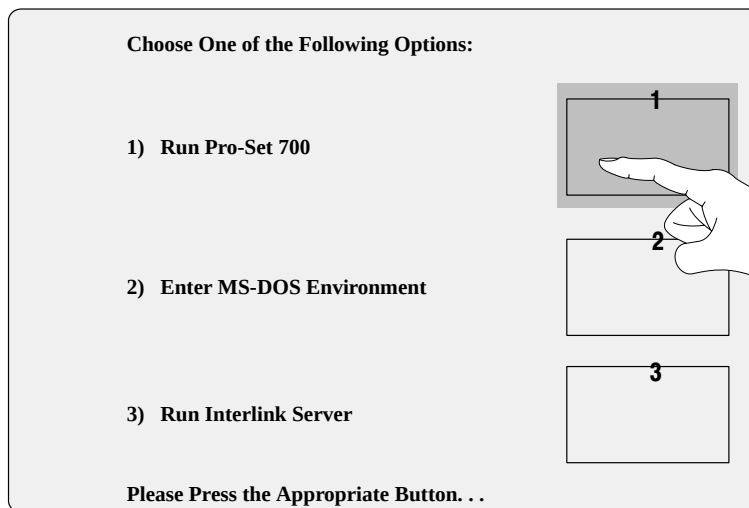


Important: Pro-Set 700 software is already installed on your operator interface hard drive. If you have not already done so, back up your hard drive. For additional information, see the Pro-Set 700 Operator Interface Installation Manual, publication. 6500-6.2.1.

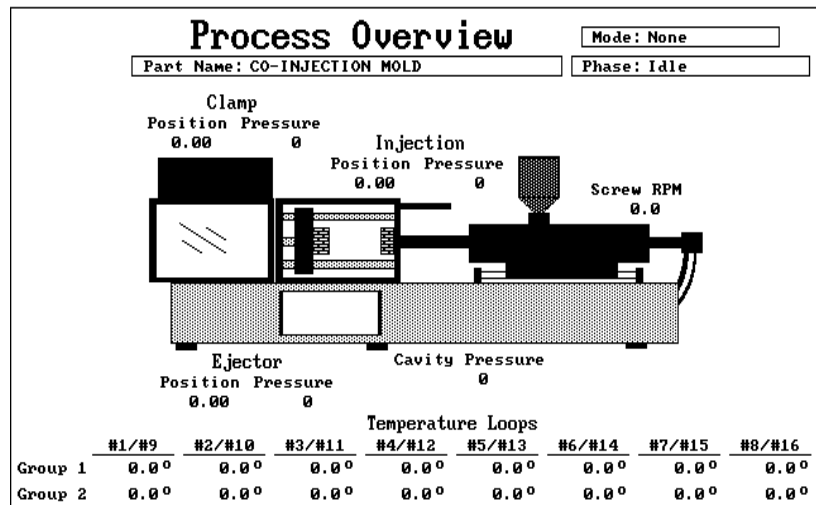
Starting Pro-Set 700 Software

To start Pro-Set 700 software, follow these steps:

1. Apply power to the operator interface. The system momentarily conducts a self-test. When the self-test is completed, you see:



2. Select 1) Run Pro-Set 700. The system loads the Pro-Set 700 application files. After the system finishes loading, you see the Process Overview screen:



Important: You are logged in at security level 0 (zero). To enter data, obtain your correct user name and default password from your supervisor.

Using the Keypad

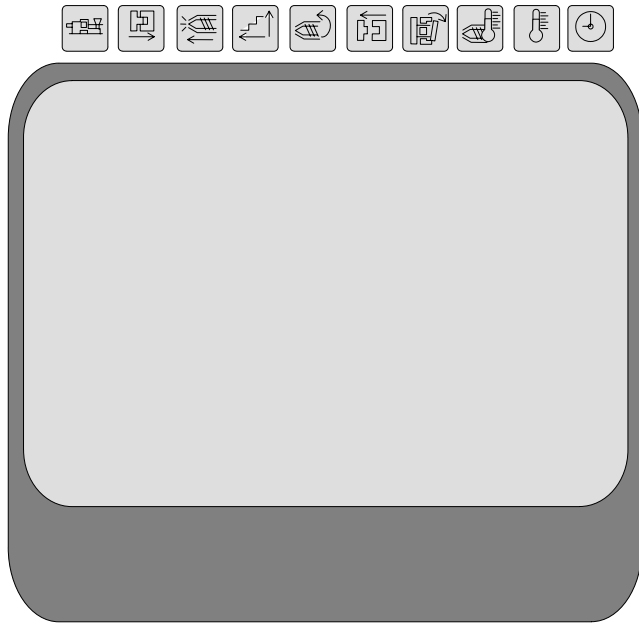
Before you begin using Pro-Set 700 software, we suggest that you become familiar with the keypad layout.



System Setup and Control

The system setup and control keys are located on the left and right sides of the screen.

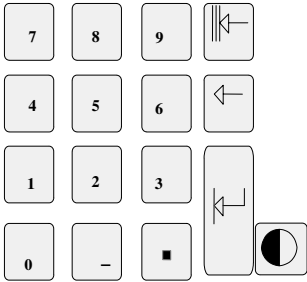
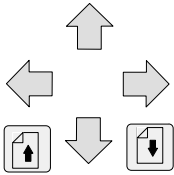
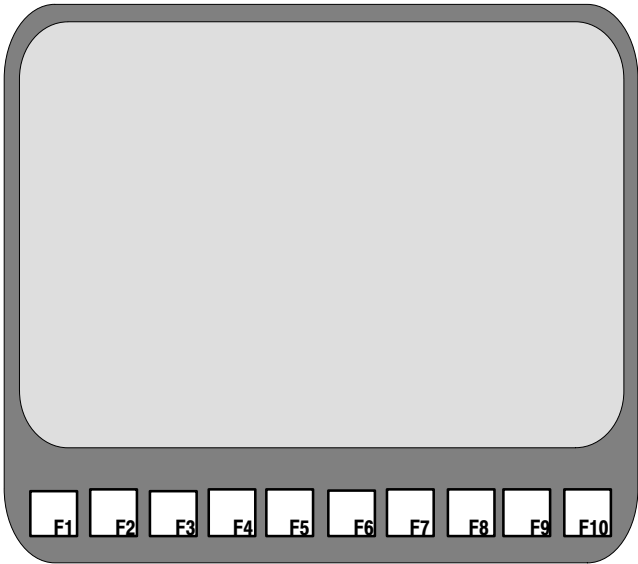
to	press
observe and react to alarm conditions	 <i>Alarm</i>
log in or out	 <i>Security</i>
configure Pro-Set 700 software	 <i>Setup</i>
observe maintenance data	 <i>Maintenance</i>
enter, change, view parameters for SPI connected devices	 <i>SPI</i>
exit to the previous screen	 <i>Exit</i>
get more information	 <i>Help</i>
print the screen	 <i>Print</i>
save or restore the mold/part file of setpoints for producing a part	 <i>Mold/Part Storage</i>
view SPC charts	 <i>SPC</i>
enter, change, view parameters for monitoring production	 <i>Production Monitor</i>
download information to the PLC processor	 <i>Download</i>



Injection Molding Profiles

The injection molding profile keys are located above the screen.

to	press
observe machine inputs of position, pressure, RPM, and temperature	 <i>Machine Overview</i>
control closing clamp	 <i>Clamp Close</i>
control injecting resin into the mold	 <i>Inject</i>
control packing and holding resin in the mold	 <i>Pack/Hold</i>
control reloading the barrel for the next shot	 <i>Plastication</i>
control opening clamp	 <i>Clamp Open</i>
control ejecting part from mold	 <i>Eject</i>
control the barrel temperature loops	 <i>Barrel Temperature</i>
control the auxiliary temperature loops	 <i>Auxiliary Temperature</i>
observe timers and counters	 <i>Timers & Counters</i>



Cursor Movement

The keys that let you move the cursor are located below the screen.

to	press
move the cursor up one field	Up Arrow
move the cursor down one field	Down Arrow
move the cursor to the right one field or character	Right Arrow
move the cursor to the left one field or one character	Left Arrow
move the cursor to the previous page	Previous Page
move the cursor to the next page	Next Page

Data Entry

Data entry keys are located below the screen.

to	press
delete the contents of an input field	Delete field
delete one character to the left of the cursor	Delete Character
accept the value	Enter

Selection Keys

Selection keys are located below the screen.

to	press
select the function displayed on the button	Touchscreen button
program to customize software to your application	Soft Function Key
Enter a digit (0 through 9)	Numbers
Enter a symbol (- or .)	Symbols
adjust the display contrast (dual-scan color only)	Contrast

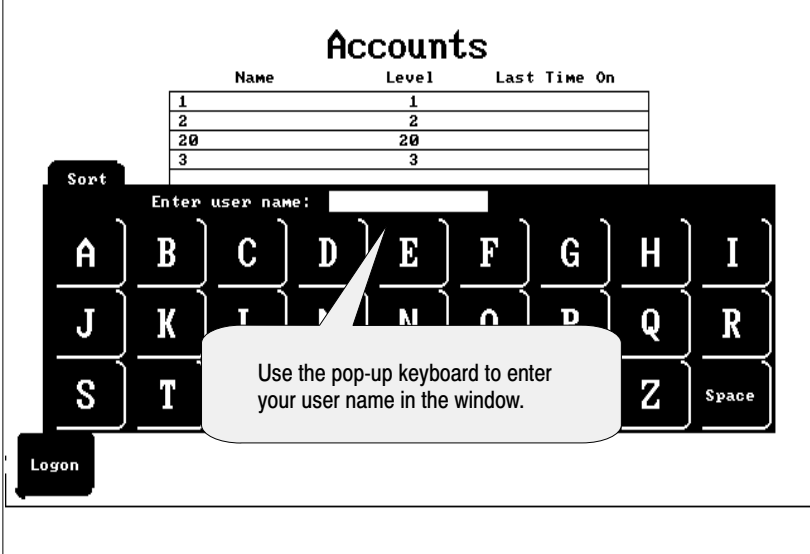
Follow this procedure to log on to the system.

1. Press . You see this screen:



Logon

- Press the  button. You see the pop-up window that you use to enter your user name.



Accounts

Name	Level	Last Time On
1	1	
2	2	
20	20	
3	3	

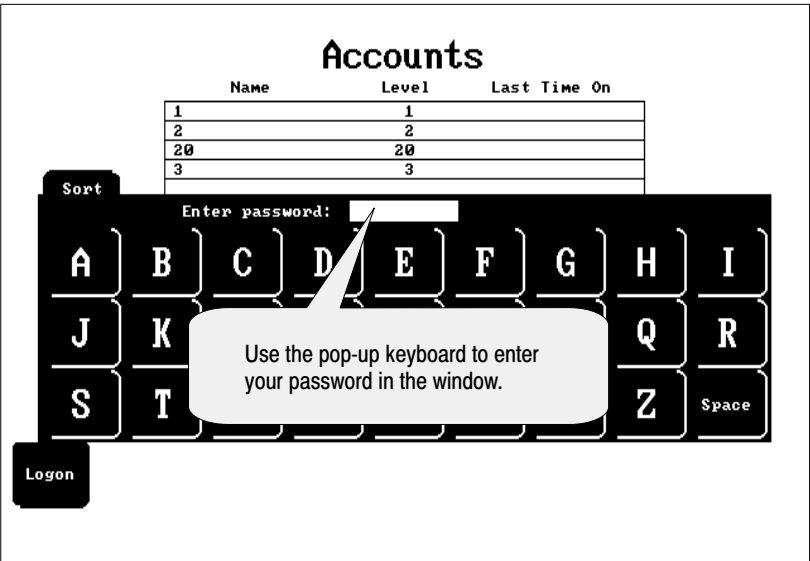
Sort

Enter user name:

Use the pop-up keyboard to enter your user name in the window.

Logon

- Use the pop-up keyboard to enter your user name in the entry window.
- Press the  key. A pop-up window that you use to enter your password appears.
- If this is the first time you log on to Pro-Set 700 software, you are prompted to enter a new password. Select a new password, enter it, and re-enter it when prompted.



Accounts

Name	Level	Last Time On
1	1	
2	2	
20	20	
3	3	

Sort

Enter password:

Use the pop-up keyboard to enter your password in the window.

Logon

- | if this happens | do this |
|--|---|
| the logon screen clears, and the Pro-Set 700 screen that was displayed before you pressed the security button is displayed | Continue using Pro-Set 700 software. You have successfully logged on. |
| a prompt instructing you to re-enter your password is displayed | Check that your password is correct, and carefully re-type it. |

Follow this procedure to log off of the system.

- 



- Logoff

Changing Your Password

Follow this procedure to change your password.

1. Press . You see this screen:

 Security

Logon
Selectd
Account

Sort
By
Name

Sort
By
Time

Name	Level	Last Time On
1	1	11/27/96 14:19:46
2	2	
20	20	
3	3	

Logon

Logoff

Change
Pass-
word

View
Downld
Log

HW1: 51 Name: 1 Level: 1 Mach ID: Machine ID
Nov 27 2:20:11 PM

Press the  key to change your password.

2. Press the  key to change your password. You see this screen.

Logon
Selectd

Name	Level	Last Time On
1	1	11/27/96 14:23:28
2	2	

Enter old password: _

A B C D E F G H I

J K L M N O P Q R

S T U V W X Y Z Space

Use the pop-up keyboard to enter your password in the window.

Logon

Logoff

Change
Pass-
word

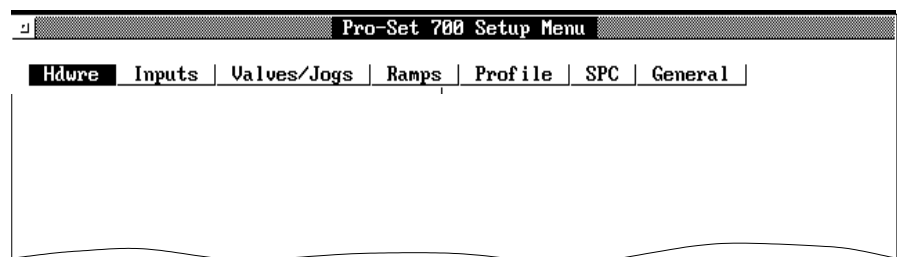
View
Downld
Log

HW1: 51 Name: 1 Level: 1 Mach ID: Machine ID
Nov 27 2:23:46 PM

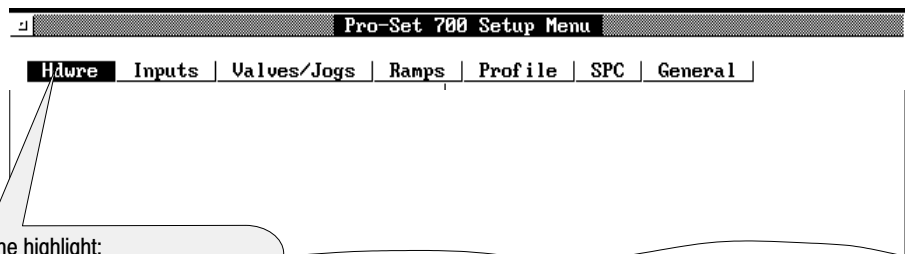
3. Enter your current password. Press the  key.
4. Enter your new password. Press the  key.
5. Re-enter your new password. Press the  key.

Using Menus

When you press , you see this Setup menu bar.



Moving across the Menu Bar

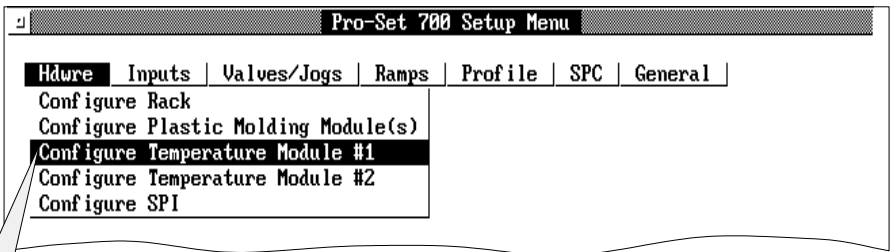


To move the highlight:

- right across the menu bar, press 
- left across the menu bar, press 

To move directly to a menu, touch the appropriate menu title.

Opening a Menu

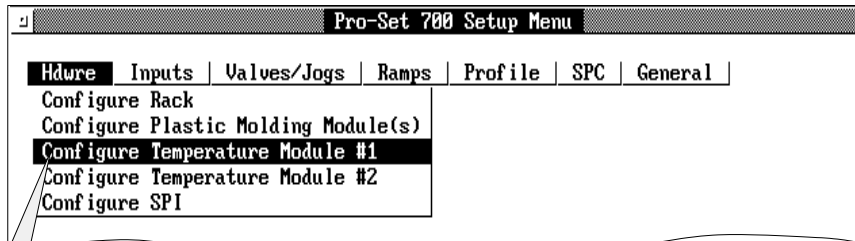


To open a menu, move the highlight to the menu title and press



To go directly to a menu item, touch the appropriate menu item.

Moving through a Menu



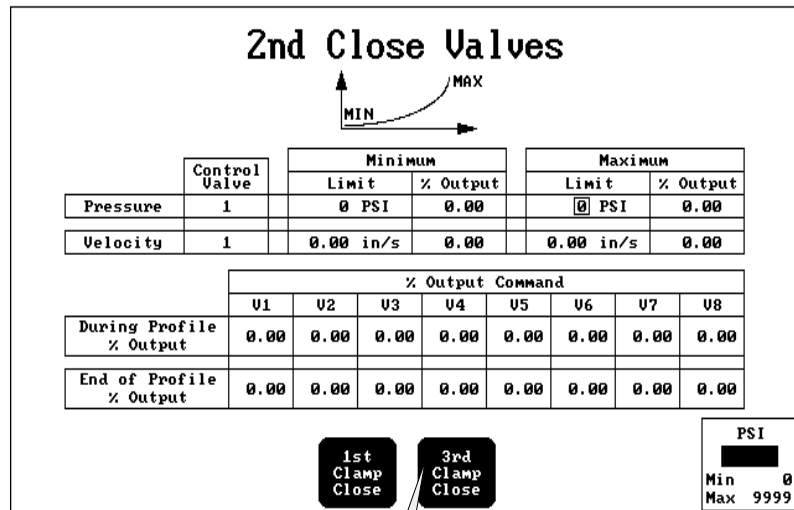
To move the highlight:

- down the menu, press 
- up the menu, press 

Using Menu Shortcuts

Once you have selected a menu option, the display offers you another method of moving around the Setup menu. At the bottom of the display are buttons that let you move back or forward one menu option.

Values/Jogs
Screw Jogs
Clamp/Eject Jogs
1st Clamp Close
2nd Clamp Close
3rd Clamp Close
LP Close
Tonnage
Injection
Pack
Hold
Pre-Decompress
Plastication
Post-Decompress
1st Clamp Open
2nd Clamp Open



You can move one menu option back or forward. Just touch the button on the display.

Entering Data

You enter data by:

- typing a value
- selecting from a list
- using a pop-up keyboard

Typing a Value

2nd Close Valves

MIN

MAX

	Control Valve	Minimum		Maximum	
		Limit	% Output	Limit	% Output
Pressure	1	0 PSI	0.00	0 PSI	0.00
Velocity	1	0.00 in/s	0.00	0.00 in/s	0.00

	% Output Command							
	V1	V2	V3	V4	V5	V6	V7	V8
During Profile % Output	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
End of Profile % Output	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1st Clamp Close

3rd Clamp Close

PSI

0

Max 9999

To enter a value, type the number in this field, and then press .

The minimum and maximum values appear directly below the data entry field.

Selecting from a List

2nd Close Values

Control Valve	Minimum		Maximum	
	Limit	% Output	Limit	% Output
Pressure 1	0 PSI	0.00	0 PSI	0.00
Velocity 1	0.00 in/s	0.00	0 in/s	0.00

Highlight your choice from the pop-up list that appears and then press [Enter]

To select from a list, highlight the field and then press [Enter]

If you don't see a minimum and maximum value and you can't type in a value, then this field has a pop-up list. To get the pop-up list, press [Enter]

Buttons: Exit, 1st Clamp, 3rd Clamp Close, min

Using a Pop-Up Keyboard

Mold/Part Storage This Machine's ID
VAN DORN

Active Part Setup

Item	Date	Time	Machine ID	Name
2	07/08/94	13:59:35	M	

Pop-Up Keyboard: E, F, G, H, I, J, K, L, M, N, O, P, Q, R

Sa (sk)

Item	Date	Time	Machine ID	Name
1	04/28/94	09:16:01	PRESS 141	MOLD 2007-1
2	05/13/94	15:47:01	PRESS 141	MOLD 2239-1
3	05/13/94	17:01:42	PRESS 141	MOLD 2239-1
4	05/20/94	13:06:57	PRESS 141	MOLD 2238-2
5	-----	-----	-----	* Unused *

Description of Selected
Active Part File Description

Buttons: Machine Setups, Floppy Disk, Toggle Restore Only, Save & Restore, Compare & Export, Cut, Copy & Paste, Change Names & Descs.

HW1: 3

Security Level: 3

Sep 13, 1994 10:42:01 am

Downloading Data

Once you enter data, you see this message at the top of the screen:

DOWNLOAD REQUIRED

When you are finished entering data, download it to the PLC processor.

2nd Close Valves

MIN MAX

	Control Valve	Minimum		Maximum	
		Limit	% Output	Limit	% Output
Pressure	1	0 PSI	0.00	0 PSI	0.00
Velocity	1	0.00 in/s	0.00	0.00 in/s	0.00

	% Output Command							
	V1	V2	V3	V4	V5	V6	V7	V8
During Profile % Output	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
End of Profile % Output	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1st Clamp Close 3rd Clamp Close

PSI
Min 0
Max 9999

You can escape this screen and return to the menu without saving your entries.

Use this button to download data to the PLC processor.

Selecting a Language

Pro-Set 700 software can display some files in several foreign languages, depending on your system configuration. To view files in a language other than English, follow this procedure.

1. Log on to the system at level 3 or higher.
2. From the Setup menu, select the General menu.
3. Move the cursor to the item labelled `Select Language`. Press Enter. You see a pop-up menu listing currently available languages.
4. Select the desired language.

Using On-line Help

You can access helpful information about Pro-Set 700 software as you work.

- To access information about a data entry or selection field, move



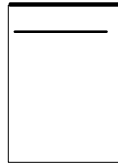
the cursor to the field and press the key. You see a pop-up help file.

- For more information about the screen, press the



again. You see a full-screen help file.

What's Next?



In Chapter 4, you learn about configuring ProSet 700 system modules.

Configuring Pro-Set 700 System Modules

What's in This Chapter?

This chapter describes how to install and configure the modules you use with Pro-Set 700 software. This chapter helps you to complete these tasks:

- determine the modules' positions in the I/O chassis
- define system hardware
- determine and record I/O ranges
- configure QDC modules
- configure Temperature Control modules
- configure SPI modules

What Basic Modules Do I Need to Order?

A basic Pro-Set 700 system consists of at least one of each of the following modules:

- a 1771 rack
- a power supply
- an Enhanced PLC-5 processor
- Plastic Molding module (catalog no. 1771-QDC)
- Temperature Control module (catalog no. 1771-TCM)

What Optional Modules Should I Order?

These modules are optional. You can add them based on your system requirements:

- SPI communication module (catalog no. 1771-SPI)
- ac input modules (catalog no. 1771-IAD)
- ac outputs (catalog no. 1771-OAD)
- dc inputs (catalog no. 1771-IBD)
- dc outputs (catalog no. 1771-OBDD)
- two co-injection modules (catalog no. 1771-QI)
- other standard Allen-Bradley 1771 modules



Important: Refer to the Co-injection Modules User Manual, publication 6500-6.5.19, for more information on installing co-injection modules. Refer to the Temperature Controller Module User Manual, publication 1717-6.5.120, and the SPI Module User Manual, publication 1771-6.5.97 for information on installing those modules.

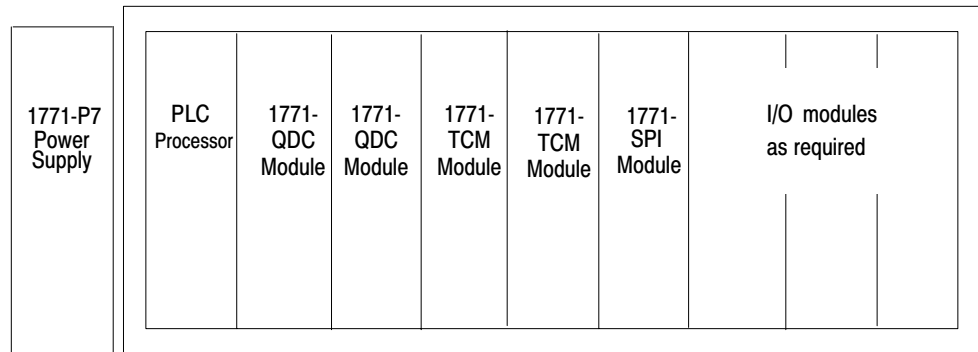


ATTENTION: Remove power from the I/O chassis backplane and wiring arm before removing or installing modules. Failure to remove power could cause injury or equipment damage due to unexpected operation.

Determining the Modules' Positions in the I/O Chassis



Here is the module layout for a basic system with optional SPI and I/O modules. Refer to the Co-injection Modules User Manual, publication 6500-6.5.19 for more information on co-injection modules. Refer to the Temperature Controller Module User Manual, publication 1717-6.5.120, and the SPI Module User Manual, publication 1771-6.5.97 for information on those modules.



I/O Chassis

1771-P7 Power Supply: Provides power to the chassis backplane

PLC Processor: Provides communication to and from the modules and the host computer

1771-QDC Plastic Molding Module: Controls Clamp and Eject functions

1771-TCM Temperature Control Modules: Monitor setpoint and actual machine temperatures

1771-SPI Module: Provides SPI-approved communication protocol to and from remote devices

I/O Modules (as required): Provide additional functions as required by your application

Defining System Hardware

Use the Pro-Set 700 Co-injection Rack Configuration screen to select operating modes for each module.

Rack Configuration

PLC Type 5/20

SLOT	Module	Mode
0	Plastic Molding Module #1	Inject
1	Plastic Molding Module #2	Not Used
2	Control Module #1	Used
3	Control Module #2	Not Used
4	SPI Module	Not Used

The modules must be placed in the I/O chassis in the same order presented here.
If a slot is empty, select **Not Used** and leave the slot empty.

HW1: Name: 3 Level: 3 Apr 02 6:10:44 am

1. Log on to the system at level 3 or higher.
2. Attach the PLC processor to the operator interface. Refer to the Pro-Set 700 Operator Interface Installation Manual, publication 6500-6.2.1, for information on cabling.
3. From the Setup menu, select the Rack Configuration screen.
4. Move the cursor to the appropriate field on the screen.



5. Press . You see a pop-up menu.
6. Place the cursor on the selection you want to make and press . You can select:

- PLC processor type
- mode of operation

in this field	select
PLC type	type of PLC processor
Slot 0	operating mode of QDC module in slot 0 choose from: • Inject • Inject-Clamp • Inject-Clamp-Eject
Slot 1	operating mode of QDC module in slot 1 choose from: • Not used (QDC module in slot 0 = Inject-Clamp-Eject mode) • Clamp-Eject
Slot 2	TCM #1 Used or Not Used
Slot 3	TCM #2 Used or Not Used
Slot 4	SPI module Used or Not Used
Clamp Control	control of clamp by PMM #1 or PMM #2 displayed only when QDC in slot 0 = Inject-Clamp and QDC in slot 1 = Clamp-Eject

7. Press  to confirm your selections.

8. Press  to download your selections to the PLC-5 processor.

Determining and Recording I/O Ranges

You must determine module I/O ranges before you can configure QDC modules. To determine I/O ranges, define and record the following information about your control system. We provide an example worksheet and a blank worksheet that you can complete.

You will record this information about your system:

- QDC module operating modes (inject, clamp, eject, or any combination)
- the QDC module's slot number (0 or 1)
- inputs from your injection molding machine
- signal ranges of the I/O devices connected to the modules
- outputs to the selected control valve and other valves

Follow these steps to determine I/O ranges. Complete one worksheet for each operating mode.

1. Select the QDC module's operating mode. Choose from:

- inject-clamp-eject mode
- inject mode
- inject-clamp mode
- clamp-eject mode

2. Select the slot number (0 or 1) for the module.

3. Refer to the specifications that accompanied your sensors to determine the operating range.

4. Select the inputs from the four options on the worksheet.

5. Circle the I/O ranges for each input.

6. Determine the outputs you want to assign.

7. Circle the I/O ranges for each output.

Important: In the sample worksheet below, items in ***bold, italicized*** text are examples of information you can add to the worksheet, based on your configuration.

Mode: *Inject* **Slot:** *0*

Inputs:		Signal Ranges:	
Input 1: screw position	0 to 10V dc	1 to 5V dc	4 to 20 mA
Input 2: system pressure	0 to 10V dc	1 to 5V dc	4 to 20 mA
Input 3: clamp position	0 to 10V dc	1 to 5V dc	4 to 20 mA
Input 4: ejector position	0 to 10V dc	1 to 5V dc	4 to 20 mA
Outputs:		Signal Ranges:	
Output 1: <i>injection pressure</i>	-10 to 10V dc	0 to 10V dc	4 to 20 mA
Output 2: <i>unused</i>	-10 to 10V dc	0 to 10V dc	4 to 20 mA
Output 3: <i>clamp flow</i>	-10 to 10V dc	0 to 10V dc	4 to 20 mA
Output 4: <i>not connected</i>	-10 to 10V dc	0 to 10V dc	4 to 20 mA



Here is a blank worksheet you can photocopy and use to record your own I/O ranges.

Mode: _____ **Slot:** _____

Inputs:		Signal Ranges:	
Input 1: screw position	0 to 10V dc	1 to 5V dc	4 to 20 mA
Input 2: system pressure	0 to 10V dc	1 to 5V dc	4 to 20 mA
Input 3: clamp position	0 to 10V dc	1 to 5V dc	4 to 20 mA
Input 4: ejector position	0 to 10V dc	1 to 5V dc	4 to 20 mA
Outputs:		Signal Ranges:	
Output 1:	-10 to 10V dc	0 to 10V dc	4 to 20 mA
Output 2:	-10 to 10V dc	0 to 10V dc	4 to 20 mA
Output 3:	-10 to 10V dc	0 to 10V dc	4 to 20 mA
Output 4:	-10 to 10V dc	0 to 10V dc	4 to 20 mA

Configuring QDC Modules

Use the information on your completed worksheet to specify I/O ranges of devices connected to the QDC module(s).



Setup

...

Hdware

- Configure Rack
- Configure Plastic Molding Module(s)** ...
- Configure Temperature Module #1
- Configure Temperature Module #2
- Configure SPI

Plastic Molding Module(s)

Input Range Selections

Screw Position	Not Connected
Screw Pressure	1 to 5 VDC
Clamp Position	Not Connected
Clamp Pressure	1 to 5 VDC
Injector Position	Not Connected
Injector Pressure	4 to 20 MADC
Screw RPM	Not Connected
Cavity Pressure	1 to 5 VDC

Output Range Selections

Output #1	Not Connected
Output #2	Not Connected
Output #3	0 to 10 VDC
Output #4	-10 to 10 VDC
Output #5	0 to 10 VDC
Output #6	-10 to 10 VDC
Output #7	0 to 10 VDC
Output #8	-10 to 10 VDC

Use the worksheet to select inputs and assign ranges to match sensors.

If you are not using an input in your application, select **Not Connected**.

For one QDC module:

- define outputs 1 through 4
- select **Not Connected** for outputs 5 through 8

For two QDC modules:

- define outputs 1 through 4 for module #1
- define outputs 5 through 8 for module #2

To complete this screen:



1. Attach the PLC processor to the operator interface. Refer to the Pro-Set 700 Operator Interface Installation Manual, publication 6500-6.2.1, for information on cabling.
2. From the Setup menu, access the Plastic Molding Module(s) screen.
3. Move the cursor to the appropriate selection field.
4. Press  to view your choices.

select input ranges from the following	select output ranges from the following
0 to 10V dc	-10 to +10V dc
1 to 5V dc	0 to 10V dc
4 to 20mA	4 to 20mA
not connected	not connected

5. Press  to enter your choice into the field.
6. Press  to store your selections.

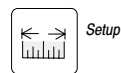
Configuring Temperature Control Modules

To use the temperature control modules, you must define temperature loops on the molding machine to control barrel and nozzle temperatures. You can define as many as 8 temperature loops per module.

Setting up Temperature Loops

To set up temperature loops, use these screens:

- Temperature Group #1 – First Setup
- Temperature Group #2 – Second Setup
- Temperature Group #3 – Third Setup



Setup

Hdwre

Configure Rack
Configure Plastic Molding Module(s)
Configure Temperature Module #1
Configure Temperature Module #2
Configure SPI

Temperature Group #1 – First Setup

	Loop Number							
	1	2	3	4	5	6	7	8
Operation Mode	Control	Control	Control	Control	Unused	Unused	Unused	Monitor
High CV Limit	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Low CV Limit	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00
Loop Setpoint	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loop PID Error	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heat Prop Gain	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000
Heat Intg Gain	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100
Heat Derv Gain	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Cool Prop Gain	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000
Cool Intg Gain	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100
Cool Derv Gain	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0

Second
SetupThird
SetupTuning
AssistAlarm
StatusMin
Max

HW1: 31

Name: 3

Level: 3

Sep 16 11:47:15 am



1. Attach the PLC processor to the operator interface. Refer to the Pro-Set 700 Operator Interface Installation Manual, publication 6500-6.2.1, for information on cabling.
2. From the Setup menu, go to the Temperature Group #1 – First Setup screen.
3. Move the cursor to the appropriate selection field.

4. Enter values or selections into the field, or press  to view your choices. Make your selections from the following table.

select this field	and do this
Operation Mode	toggle these selections: • Unused if not using the loop • Monitor to report temperature • Control if using the loop to control and report temperature
Loop Setpoint	monitor data in this read-only field read setpoints from the TCM for each temperature loop
High CV Limit	enter a setpoint for maximum heating or cooling • for forward-acting sensors, increase percentages for an increase in heating or cooling • for reverse-acting sensors, decrease percentages for an increase in heating or cooling
Low CV Limit	enter a setpoint for minimum heating or cooling • for forward-acting sensors, increase percentages for an increase in heating or cooling • for reverse-acting sensors, decrease percentages for an increase in heating or cooling
Loop PID Error	monitor data in this read-only field the field reads data from the TCM and reports an error when the process variable (PV) goes above or falls below the setpoint
Heat Prop Gain Heat Intg Gain Heat Derv Gain Cool Prop Gain Cool Intg Gain Cool Derv Gain	enter a setpoint between the min and max follow guidelines for setting up PID loops

5. Press  to store your selections.

6. From the First Setup screen, go to the Temperature Group #1 – Second Setup screen.

Temperature Group #1 – Second Setup

	Loop Number							
	1	2	3	4	5	6	7	8
T/C Type	J	J	J	J	mV	mV	mV	J
Alarming	Enable	Enable	Enable	Enable	Disable	Disable	Disable	Enable
Alarm Deadband	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rate Alarm SP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PID Action	Forward	Forward	Forward	Forward	Forward	Forward	Forward	Forward
Tuning Assist	Enable	Enable	Enable	Enable	Disable	Disable	Disable	Disable
Stpt Ramping	Disable	Disable	Disable	Disable	Disable	Disable	Disable	Disable
Stpt Ramp Rate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PID Maximum PV	999.0	999.0	999.0	999.0	0.0	0.0	0.0	999.9
PID Minimum PV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

First Setup
Third Setup
Tuning Assist
Alarm Status

Min
Max

HMI: 3
Security Level: 3
Sep 13, 1994 10:54:35 am

7. Move the cursor to the appropriate selection field.

8. Enter values or selections into the field, or press  to view your choices. Make your selections from the following table.

select this field	and do this
T/C Type	select the type of thermocouple used in your machine
Alarming	select Enable or Disable
Alarm Deadband	enter a setpoint to avoid nuisance alarms when the machine comes up to temperature
Rate Alarm SP	enter a setpoint for the rate of change for a process variable (temperature) an alarm will be generated if the variable goes out of the range you select
PID Action	select Forward- or Reverse-acting
Tuning Assist	select Enable or Disable
Stpt. Ramping	select Enable or Disable
Spt. Ramp Rate	enter a setpoint to allow a smooth transition to a new setpoint
PID Maximum PV	enter a setpoint from PID Minimum PV to 999.9 degrees
PID Minimum PV	enter a setpoint from 0 to PID Maximum PV

9. Press  to store your selections.

10. From the Second Setup screen, access the Temperature Group #1 – Third Setup screen.

Temperature Group #1 – Third Setup								
	Loop Number							
	1	2	3	4	5	6	7	8
On T/C Break	Zero CV	Zero CV	Zero CV	Zero CV	Zero CV	Zero CV	Zero CV	Zero CV
T/C Brk Set CV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
On Tml Runaway	Zero CV	Zero CV	Zero CV	Zero CV	Zero CV	Zero CV	Zero CV	Zero CV
RunAway Set CV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RunAway DeltaT	0	0	0	0	0	0	0	0
RunAway Period	0	0	0	0	0	0	0	0
Heat Max Time	15.00	15.00	15.00	15.00	0.00	0.00	0.00	15.00
Heat Min Time	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cool Max Time	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cool Min Time	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heat TP Output	6 / 7	6 / 10	6 / 11	6 / 12	0 / --	0 / --	0 / --	0 / --
Cool TP Output	0 / --	0 / --	0 / --	0 / --	0 / --	0 / --	0 / --	0 / --

First Setup
Second Setup
Tuning Assist
Alarm Status

Min
Max

HM1: 0

Security Level: 3

Nov 22, 1995 2:02:00 pm

11. Move the cursor to the appropriate selection field.

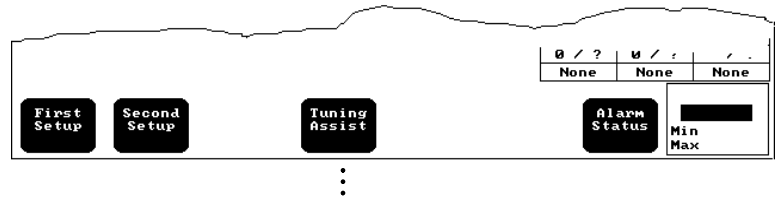
12. Enter values or selections into the field, or press  to view your choices. Make your selections from the following table.

select this field	and do this
On T/C Break	select Zero CV, Set CV, or Manual CV
T/C Break Set CV	enter a setpoint for T/C break CV
On Tml Runaway	select Zero CV, Set CV or Manual CV
RunAway Set CV RunAway DeltaT RunAway Period	enter setpoints for thermal runaway
Heat Max Time	enter a setpoint for the total maximum heat on time for each period
Heat Min Time	enter a setpoint for the total minimum heat on time for each period
Cool Max Time	enter a setpoint for the total maximum cool on time for each period
Cool Min Time	enter a setpoint for the total minimum cool on time for each period
Heat TP Output Cool TP Output	enter the group and terminal number

13. Press  to store your selections.

Setting up PID Gains

Use the Tuning Assist screen to set up PID Gains.



Temperature Group #1 - Tuning Assist																
	Loop Number															
	1		2		3		4		5		6		7		8	
Temperatures	410	387	400	394	400	398	400	385	0	94	0	0	0	0	0	0
Done / Success	✓		✓		✓		✓		✓		✓		✓		✓	
Heat Prop Gain	1.682		2.154		1.999		1.544		0.000		0.000		0.000		0.000	
Heat Intg Gain	0.0025		0.0009		0.0009		0.0024		0.0000		0.0000		0.0000		0.0000	
Heat Derv Gain	54.8		85.4		77.3		59.7		0.0		0.0		0.0		0.0	
Cool Prop Gain	0.000		0.000		0.000		0.000		0.000		0.000		0.000		0.000	
Cool Intg Gain	0.0000		0.0000		0.0000		0.0000		0.0000		0.0000		0.0000		0.0000	
Cool Derv Gain	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	

Below the table are five buttons: 'First Setup', 'Second Setup', 'Third Setup', 'Tuning Assist Stop', and 'Tuning Assist Start'. To the right of these buttons is an 'Alarm Status' button.

HM1: 31

Name: 3

Level: 3

Mach ID: UD170
Oct 30 1:57:38 pm

1. Press the Tuning Assist Start button.
2. Press the download button. Loops must be on and in auto and Run modes.

Configuring the SPI Module

The SPI Configuration screen below shows configuration information for SPI devices added to your injection molding system.

SPI Configuration

Communication's Baud Rate	9600
Number of Devices	3
Numeric Data Format	Binary
Command not Supported Errors Inhibited	
Command not Executed Errors Inhibited	

#	Device	Zone	Address	Mode	Control
1	Mold Temperature Controller	0	32	Enabled	Normal
2	Mold Temperature Controller	0	33	Enabled	Normal
3	Dryer	0	34	Enabled	Normal

Min
Max

HW1: 3 Security Level: 3 Sep 13, 1994 9:44:41 am

To configure SPI devices:



1. Attach the PLC processor to the operator interface. Refer to the Pro-Set 700 Operator Interface Installation Manual, publication 6500-6.2.1 for information on cabling.
2. From the Setup menu, go to the Configure SPI screen.
3. Move the cursor to the appropriate selection field.

4. Enter your values or selections into the appropriate field, or press



to view your choices. Make your selections from the following table.

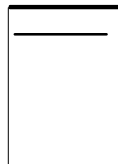
select this field	to view
Communications Baud Rate	selected baud rate and all valid baud rates
Number of Devices	number of SPI devices selected
Numeric Data Format	format for all numeric data (floating point, integer, binary or BDC) Note: only binary is currently supported
Command Not Supported Errors	enabled or disabled reporting of Command Not Supported errors from the SPI device
Command Not Executed Errors	enabled or disabled reporting of Command Not Executed errors from the SPI device
Device Type	device types for each SPI device added to the machine
Zone Address	address in a range from 0 (zero) or 48 – 255 (decimal) for each device
Station Address	address in a range from 32 – 255 (decimal) for each device
Mode	enabled or disabled devices
Control	normal or protected control

5. Press



to store your selections.

What's Next?



In Chapter 5, you learn how to set up sensor inputs.

Setting up Sensor Inputs

What's in This Chapter?

With information from sensor specifications, you enter initial spanning values to define limits of sensor operation. We show you the inputs screens that you use to define sensor limits and alarm setpoints in your software.

This chapter shows you how to use inputs screens to enter:

- initial sensor spanning limits so you can jog your machine
- alarm setpoints for pressure and RPM sensor inputs

Important: The choices that you make in this chapter affect how Pro-Set 700 presents Setup screens for profiles. In later chapters if the software prevents you from entering certain setup information, check the screens in this chapter. You may need to make changes.

How Do I Set up Sensor Inputs?

You enter initial spanning values to define limits of sensor operation, including:

- minimum position, pressure, or RPM
- signal level at minimum
- maximum position, pressure, or RPM
- signal level at maximum

You use inputs screens to define sensor limits and alarm setpoints. Refer to your sensor specifications for information on limits of operation.

The QDC module continuously monitors all of its inputs for loss of a sensor. When it detects that the process input is greater or less than the input's range, the QDC module sets an alarm that is displayed on your operator interface panel.

To avoid nuisance alarms caused by electrical noise, you can set a time delay so the QDC module must monitor continuous out-of-range signals for an amount of time before setting the loss of sensor alarm. A zero time delay gives no protection against nuisance alarms.

Optionally, you can disable these alarms by setting the appropriate inhibit bit. These bits are specified in the QDC Software Reference Manual, publication 1771-6.5.88. You will then need to substitute your own ladder logic to trigger the loss of sensor alarm.

Setting up a Position Sensor

Set up the software to accept position sensor signals with position Setup screens.

Screw Position

Real-Time Values
0.00 0.00
VDC INCHES

MOLD END BACK

		Name Plate	Active
MOLD END	Screw Minimum Position	0.00	0.00
	Analog Signal at Minimum Position	0.00	0.00
BACK	Screw Maximum Position	20.00	20.00
	Analog Signal at Maximum Position	10.00	10.00

Enter the sensor position and corresponding signal level for:

- mold end (minimum position)
- backpoint (maximum position)

HW1: 0 Security Level: 3 Nov 28, 1995 2:02:00 PM

1. From the Setup Inputs menu, select any of the position sensors (screw, clamp, or ejector position).
2. Enter initial spanning limits from sensor or nameplate specifications.

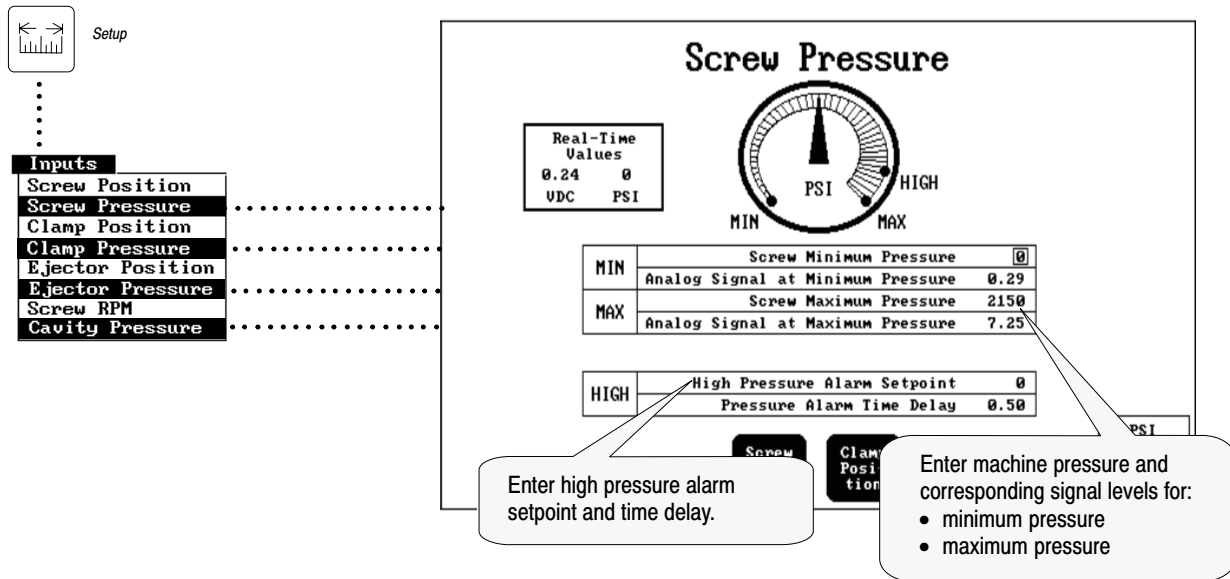
Important: Refer to specifications that accompanied your sensors and the following table to enter sensor spanning information into these fields.

in this field	if your	enter a value in the Nameplate column that is equal to
Minimum Position	N/A	min. range value specified by manufacturer
Maximum Position	N/A	max. range value specified by manufacturer
Analog Signal at Minimum Position	sensors are forward-acting sensors are reverse-acting	low end of the selected range high end of the selected range
Analog Signal at Maximum Position	sensors are forward-acting sensors are reverse-acting	high end of the selected range low end of the selected range

3. Press  to store your setpoints.

Setting up a Pressure Sensor

Set up the software to accept pressure sensor signals with pressure Setup screens.



1. From the Setup Inputs menu, select any of the pressure sensors (screw, clamp, ejector, or cavity pressure).
2. Enter initial spanning limits from sensor or nameplate specifications.

Important: Refer to specifications that accompanied your sensors and the following table to enter sensor spanning information into these fields.

in this field	if your	enter a value in the Nameplate column that is equal to
Minimum Position	N/A	min. range value specified by manufacturer
Maximum Position	N/A	max. range value specified by manufacturer
Analog Signal at Minimum Position	sensors are forward-acting sensors are reverse-acting	low end of the selected range high end of the selected range
Analog Signal at Maximum Position	sensors are forward-acting sensors are reverse-acting	high end of the selected range low end of the selected range

3. Enter high pressure alarm setpoint and time delay.

in this field	enter a value equal to
High Pressure Alarm Setpoint	maximum safe operating pressure
Pressure Alarm Time Delay	minimum delay to avoid nuisance alarms

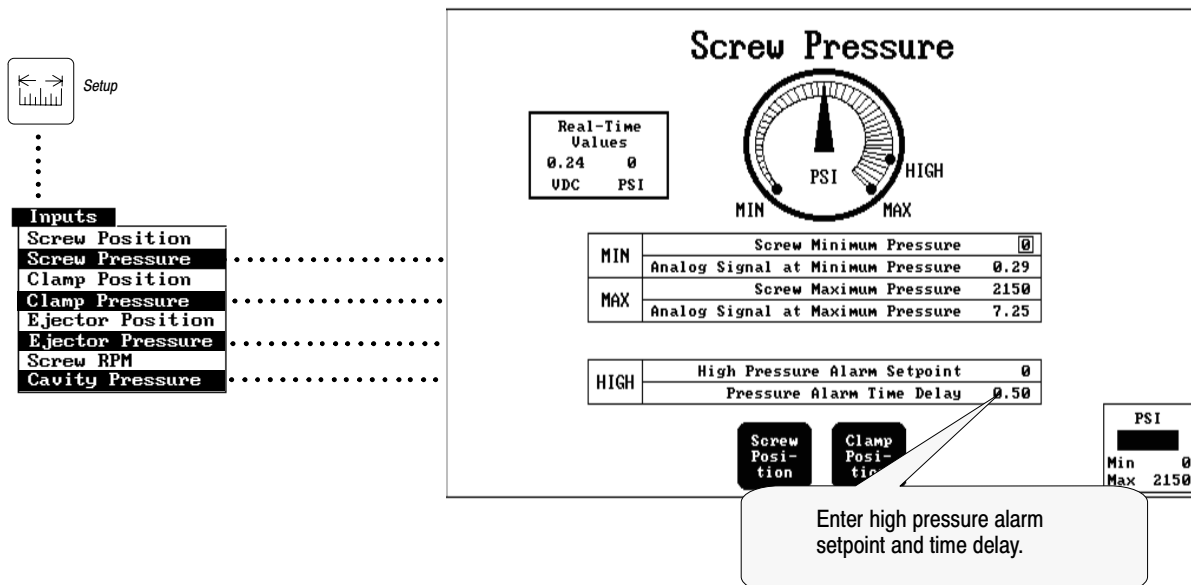
4. Press  to store your setpoints.

Setting up Alarms for Pressure Sensors

To warn of excessive pressure without nuisance alarms, you can set optional pressure alarms with a time delay that guards against setting alarms due to pressure spikes. This option is provided on some Setup screens. You can set this option as you work through Setup screens for pressure sensors.

The QDC module continuously monitors pressure input(s). When it detects that the process input equals or exceeds a preset alarm setpoint, the QDC module sets an alarm that is displayed on your operator interface panel. A zero setpoint for an alarm disables it.

To avoid nuisance alarms caused by pressure transients, you can set a time delay so the QDC module must monitor continuous excessive pressure for an amount of time before setting the high pressure alarm. A zero time delay gives no protection against nuisance alarms.



1. From the Setup Inputs menu, select any of the pressure sensors (screw, clamp, ejector, or cavity pressure).
2. Enter the high pressure alarm setpoint and time delay.

Important: Refer to specifications that accompanied your sensors and the table below to enter alarm information into these fields.

in this field	enter a value equal to
High Pressure Alarm Setpoint	screw min. pressure to screw max. pressure
Pressure Alarm Time Delay	00.00 to 00.99 seconds

3. Press  to store your setpoints.

Setting up the Screw RPM Sensor

Set up the software to accept RPM sensor signals with the RPM Setup screen.

Screw RPM

Real-Time Values
0.00 0.0
UDC RPM

MIN Screw Minimum RPM 0.0
Analog Signal at Minimum RPM 0.00
MAX Screw Maximum RPM 300.0
Analog Signal at Maximum RPM 1.00

HIGH High RPM Alarm Setpoint 0.
RPM Alarm Time Delay 0.50

Enter high RPM alarm setpoint and time delay.

Enter RPM and corresponding signal level for:

- minimum RPM
- maximum RPM

RPM 0.0
300.0
UD170
:06 PM

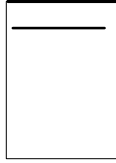
1. From the Setup Inputs menu, select Screw RPM.
2. Enter initial spanning limits from sensor or nameplate specifications.

Important: Refer to specifications that accompanied your sensors and the following table to enter sensor spanning information into these fields.

3. Enter high RPM alarm setpoint and time delay.

in this field	enter a value equal to
High RPM Alarm Setpoint	maximum safe operating RPM
RPM Alarm Time Delay	minimum delay to avoid nuisance alarms

4. Press  to store your setpoints.

What's Next?

In Chapter 6, you learn how to set up jogs to test machine operation.

Setting up Jogs

What’s in This Chapter?

After you have set up sensor inputs, you set up jogs to define clamp, screw, and ejector motion. This chapter tells you how to set up jogs for the screw, clamp, and ejector. You do this by entering %-outputs to control jog motion.

How Do I Set up Jogs?



To set up jogs, you will perform these tasks:

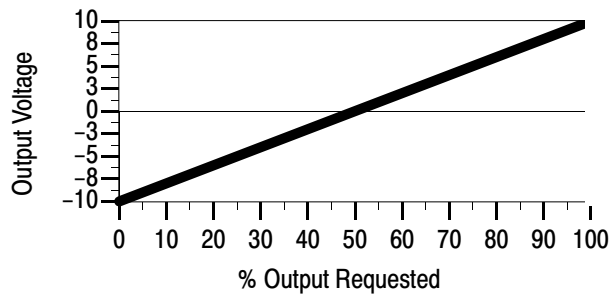
- manually set up jog %-outputs on the injection molding machine
- write ladder logic to implement jogging (refer to the Pro-Set 700 Reference Manual, publication 6500-6.4.3, or the PLC-5 Programming Software Manual, publication 6200-6.4.7)
- enter jog %-outputs with these setup screens:
 - Screw Jogs
 - Clamp/Eject Jogs

to define these setup characteristics	use this setup screen
• %-outputs for jog rotate, forward, and reverse motion • setpoint for jog high pressure alarm • setpoint for jog high RPM alarm	Screw Jogs
• %-outputs for jog forward and reverse motion • setpoint for jog high pressure alarm	Clamp/Eject Jogs

Setting up Jog %-Outputs

To set up jog %-outputs, you move the screw, clamp, and ejector slowly over their intended ranges. You do this by applying %-output signals to QDC module outputs.

Important: A %-output of zero may not correspond to zero pressure or flow. If you set QDC module %-outputs for bi-directional valve operation, an output of 0% gives –10V dc (full output, see chart). Amplifiers or spool-null offsets may also allow pressure or flow at zero volts signal input. Consult your valve and amplifier specifications.



Writing Ladder Logic to Implement Jogging

Write ladder logic to implement jogging from switch inputs on a control panel. Use the following command and status bits:

for this jog	set command bit B34/xxx to	and read this optional status bit B34/xxx
screw forward jog	394	10
screw reverse jog	395	11
clamp forward jog	396	12
clamp reverse jog	397	13
ejector advance jog	398	14
ejector retract jog	399	15
software E-stop	415	–



Disregard command and status bits you do not need.

We provide a programming example for jog control for instructional purposes only. In our example, the PLC-5 processor:

- monitors switches on your operator control panel
- transfers corresponding command bits to the QDC module
- changes the direction of travel hydraulically for reverse motion



Your application-specific programming may vary from this example. Refer to the Pro-Set 700 Reference Manual, publication 6500-6.4.3, or the documentation that came with your programming software for more information.

Example: Ladder Logic to Control Jogging the Clamp and Ejector

	EMERGENCY			
	STOP			
	CONDITION		SOFTWARE	
	EXISTS		E-STOP	
	B3		B34	
+-----]	[-----]		()-----+	
	0		415	
Rung 6:1				
	CYCLE		DIRECTION	
	CONTROL		SOLENOIDS	
	SELECTOR		CLAMP JOG	
	(A/S/M) IN		FORWARD	
	"MANUAL"		MOVE CLAMP	
	ALLOWED		FORWARD	
	I:003		B11	
+-----]	[-----]		()-----+	
	05		5	
			11	
			396	
Rung 6:2				
	CYCLE		DIRECTION	
	CONTROL		SOLENOIDS	
	SELECTOR		CLAMP JOG	
	(A/S/M) IN		REVERSE	
	"MANUAL"		MOVE CLAMP	
	ALLOWED		IN REVERSE	
	I:003		B11	
+-----]	[-----]		()-----+	
	05		6	
			12	
			397	
Rung 6:3				
	CYCLE		DIRECTION	
	CONTROL		SOLENOIDS	
	SELECTOR		EJECTOR	
	(A/S/M) IN		JOG	
	"MANUAL"		ADVANCE	
	ALLOWED		EJECTOR JOG	
	I:003		B11	
+-----]	[-----]		()-----+	
	05		7	
			13	
			398	
Rung 6:4				
	CYCLE		DIRECTION	
	CONTROL		SOLENOIDS	
	SELECTOR		EJECTOR	
	(A/S/M) IN		JOG	
	"MANUAL"		RETRACT	
	ALLOWED		EJECTOR JOG	
	I:003		B11	
+-----]	[-----]		()-----+	
	05		8	
			14	
			399	

Setting up Jogs for the Injection Screw

Use this screen to set up the following:

- %-outputs to jog the injection ram and rotate the screw
- high RPM and/or high pressure alarms for jogs

Setup

Valves/Jogs

Screw Jogs

Clamp/Eject Jogs

1st Clamp Close

2nd Clamp Close

3rd Clamp Close

LP Close

Tonnage

Injection

Pack

Hold

Pre-Decompress

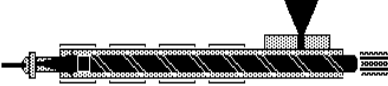
Plastication

Post-Decompress

1st Clamp Open

2nd Clamp Open

Screw Jogs



	% Output Command							
	V1	V2	V3	V4	V5	V6	V7	V8
Screw Rotate	0.00	0.00	0.00	0.00	40.00	75.00	50.00	0.00
Screw Forward	0.00	0.00	0.00	0.00	75.00	25.00	50.00	0.00
Screw Reverse	0.00	0.00	0.00	0.00	65.00	25.00	50.00	0.00
Screw RPM Alarm Setpoint	0.0							
Screw Pressure Alarm Setpoint	0							

Enter jog %-outputs for:

- screw rotate (if used)
- screw forward
- screw reverse

Enter jog high RPM and high pressure alarms

% Output

Min 0.00

Max 99.99

HW1:

Security Level: 3

Sep 13, 1994 10:18:27 am

Entering and Adjusting %-Outputs

Follow this procedure to define all outputs from the QDC module(s) before you enter %-outputs to jog and rotate the injection screw.

Important: In addition to the selected jog control valve, unselected valves may indirectly control jogging. From your hydraulic circuits, determine the direct and indirect effect of all jog outputs. Outputs V1 through V4 are for the first QDC module; outputs V5 through V8 are for the second QDC module (if used).

1. In the following table, define jogs controlled by the selected valve (S) and unselected valves (U) by placing an S or U for each output Vn (where n = the valve number).
2. Write down %-outputs for the selected jog control valve and any unselected valves that indirectly control the jog so that motion just begins.



Identify bi-directional valve outputs.

Function	V1	V2	V3	V4	V5	V6	V7	V8
Screw Rotate: S or U								
%-output								
Screw Forward: S or U								
%-output								
Screw Reverse: S or U								
%-output								

3. Set the machine to setup mode.
4. From the Valves/Jogs menu, select the Screw Jogs screen.
5. On the Screw Jogs screen, enter jog %-outputs from the table.

6. Press the  key to store jog %-outputs.

Important: When two QDC modules are used, the command to jog causes both QDC modules to immediately apply all your %-output values to outputs V1-V8.

7. Jog the machine.
8. Slowly change %-outputs, **one at a time**, as you observe the corresponding actuator movement until you reach a safe speed.

if you observe this condition	try this adjustment
rough, jerky acceleration/deceleration (hammering hydraulics)	• decrease %-output of the pressure valve • decrease %-output of the flow valve
sluggish acceleration/deceleration	boost %-output of the pressure valve

Entering Jog Alarms for High RPM or Pressure

Once you have set your %-outputs for jogging, determine what you consider to be the highest safe %-outputs and set your jog alarms to these values in the following fields on the Screw Jogs screen:

- Screw Jog RPM Alarm Setpoint (only for Inject mode of QDC module)
- Screw Jog Pressure Alarm Setpoint

Setting up Jogs for the Clamp and Ejector

Use this screen to set up the following:

- %-outputs to jog the clamp and ejector
- high pressure alarms for clamp and ejector jogs

Entering and Adjusting %-Outputs

Follow this procedure to define all outputs from the QDC module(s) before you enter %-outputs to jog the clamp and ejector.

Important: In addition to the selected jog control valve, unselected valves may indirectly control jogging. From your hydraulic circuits, determine the direct and indirect effect of all jog outputs. Outputs V5-V8 are for the second QDC module.

1. In the table below, define jogs controlled by the selected control valve (S) and unselected valves (U) by placing an S or U for each output Vn (where n = the valve number).
2. Write down %-outputs for the selected jog control valve and any unselected valves that indirectly control the jog so that motion just begins.

Function	V1	V2	V3	V4	V5	V6	V7	V8
Clamp Close: S or U								
%-output								
Clamp Open: S or U								
%-output								
%-output								
Ejector Advance: S or U								
Ejector Retract: S or U								
%-output								

Identify bi-directional valve outputs. Be sure their values are correct.

3. Set the machine mode switch to setup mode.
4. From the Valves/Jogs menu, select the Clamp/Eject Jogs screen.
5. On the Clamp/Eject Jogs screen, enter jog %-outputs from the table.

6. Press the  key to store jog %-outputs.

Important: When using two QDC modules, the command to jog causes both QDC modules to immediately apply all your %-output values to outputs V1-V8.

7. Jog the machine.
8. Slowly change %-outputs, one at a time. Observe the corresponding actuator movement until you reach a safe speed.

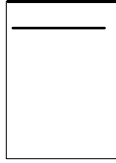
if you observe this condition	try this adjustment
rough, jerky acceleration/deceleration (hammering hydraulics)	• decrease %-output of the pressure valve • decrease %-output of the flow valve
sluggish acceleration/deceleration	boost %-output of the pressure valve

Entering Jog Alarms for High Pressure

Once you have set your %-outputs for jogging, determine what you consider to be the highest safe %-outputs and set your jog alarms to these values in these fields on the Clamp/Eject Jogs screen.

- Clamp Jog Pressure Alarm Setpoint
- Ejector Jog Pressure Alarm Setpoint

What's Next?



In Chapter 7, you learn how to span sensors through their linear operating range.

*This chapter will be included with future
edition of CD ROM.*

Symbols

Empty, [-1](#)

Numbers

1st Close, [2-7](#)

1st Open, [2-16](#)

2nd Close, [2-7](#)

2nd Open, [2-16](#)

3rd Close, [2-7](#)

3rd Open, [2-16](#)

A

Abbreviations, Used in This Manual, [P-2](#)

Acronyms, Used in This Manual, [P-2](#)

C

Clamp Close, [2-7](#)

Clamp Open, [2-15](#)

Components, Injection Molding Control System, [2-2](#)

Configuring Modules, [4-1](#)

Conventions, Used in This Manual, [P-3](#)

D

Decompression Movements

post-decompression, [2-15](#)

pre-decompression, [2-13](#)

Defining System Hardware, [4-3](#)

Downloading Data, [3-15](#)

E

Eject, [2-18](#)

Cycles, Auto-Repeat, [2-20](#)

Forward Dwell Time, [2-20](#)

Tip Strokes, [2-20](#)

Ejector Advance, [2-19](#)

Ejector Retract, [2-20](#)

Entering Data, [3-13](#)

F

Finding Your Way in Pro-Set 700 Software, [3-1](#)

G

Getting Started with Pro-Set 700 Software, [1-3](#)

H

Hold, [2-13](#)

Hold Phase, [2-13](#)

I

I/O Ranges, Determining and Recording, [4-5](#)

Initialisms, Used in This Manual, [P-2](#)

Inject Phase, [2-10](#)

Injection-to-Pack Transition, [2-12](#)

Pack Phase, [2-12](#)

pack phase, [2-13](#)

Plastication Phase, Example Profile, [2-14](#)

plastication phase, [2-14](#)

Injection Molding, Understanding, [2-4](#)

Injection Molding Control System, Components, [2-2](#)

J

Jogs

for the Clamp and Ejector, [6-6](#)

for the Injection Screw, [6-4](#)

Ladder Logic Example, [6-3](#)

Setting up, [6-1](#), [7-1](#)

Setting up Jog %-Outputs, [6-1](#)

Writing Ladder Logic for, [6-2](#)

K

Keypad, Using, [3-3](#)

L

Ladder Logic, Jogging, [6-2](#)
 Language, Selecting, [3-15](#)
 Logging off, [3-8](#)
 Logging on, [3-6](#)
 Low Pressure Close, [2-8](#)

M

Menu Shortcuts, Using, [3-12](#)
 Menus
 Downloading Data, [3-15](#)
 Entering Data, [3-13](#)
 Moving Across the Menu Bar, [3-10](#)
 Moving Through, [3-11](#)
 Openinig, [3-11](#)
 Using, [3-10](#)
 Modules
 Configuring, [4-1](#)
 Determining Position in Chassis, [4-2](#)
 Optional, [4-1](#)
 QDC, Configuring, [4-7](#)
 SPI, Configuring, [4-13](#)
 Supplied With the System, [4-1](#)
 TCM, Configuring, [4-8](#)

O

Open Slow, [2-17](#)
 Overview
 1st, 2nd, and 3rd Close, [2-7](#)
 1st, 2nd, and 3rd Open, [2-16](#)
 Clamp Close, [2-6](#), [2-7](#)
 Clamp Open, [2-5](#), [2-15](#)
 Eject, [2-5](#), [2-18](#)
 Additional Features, [2-20](#)
 Ejector Advance, [2-19](#)
 Ejector Retract, [2-20](#)
 Hold, [2-13](#)
 Inject, [2-10](#)
 Inject Phase, [2-10](#)
 Injection, [2-4](#)
 Low Pressure Close, [2-8](#)
 Open Slow, [2-17](#)
 Pack, [2-12](#)
 Plastication, [2-14](#)
 Post-decompression, [2-15](#)
 Pre-Decompression, [2-13](#)
 Process Control, [2-6](#)
 System, [2-1](#)
 Transition, [2-12](#)

P

Pack, [2-12](#)
 Pack Phase, [2-12](#), [2-13](#)
 Password, Changing, [3-9](#)
 Plastication, [2-14](#)
 Plastication Phase, [2-14](#)
 Example Profile, [2-14](#)
 Post-Decompression, [2-15](#)
 Pre-Decompression, [2-13](#)
 Pro-Set 700 Software
 Changing Your Password, [3-9](#)
 Downloading Data, [3-15](#)
 Entering Data, [3-13](#)
 Logging off, [3-8](#)
 Logging on, [3-6](#)
 Navigating, [3-1](#)
 Selecting a Language, [3-15](#)
 Starting, [3-1](#)
 Using Menu Shortcuts, [3-12](#)
 Using Menus, [3-10](#)
 Pro-Set 700 System, Configuring Modules, [4-1](#)
 Publications, Related, [P-4](#)

Q

QDC Modules, Configuring, [4-7](#)

S

Selecting a Language, [3-15](#)
 Sensor Inputs
 Setting up, [5-1](#)
 Setting up a Position Sensor, [5-2](#)
 Setting up a Pressure Sensor, [5-3](#)
 Setting up a Screw RPM Sensor, [5-5](#)
 Setting up Alarms for Pressure Sensors, [5-4](#)
 Sensors
 Position, Setting up, [5-2](#)
 Pressure
 Setting up, [5-3](#)
 Setting up Alarms, [5-4](#)
 Screw RPM, Setting up, [5-5](#)
 Setting up Jog %-Outputs, [6-1](#)
 Setting up Jogs, [6-1](#), [7-1](#)
 SPI Modules, Configuring, [4-13](#)
 Starting the Software, [3-1](#)

System Hardware, Defining, [4-3](#)

System Overview, [2-1](#)

T

Temperature Control Modules, Configuring,
[4-8](#)

Transition, [2-12](#)

U

Using Menu Shortcuts, [3-12](#)

Using Menus, [3-10](#)

Using the Keypad, [3-3](#)



Allen-Bradley, a Rockwell Automation Business, has been helping its customers improve productivity and quality for more than 90 years. We design, manufacture and support a broad range of automation products worldwide. They include logic processors, power and motion control devices, operator interfaces, sensors and a variety of software. Rockwell is one of the world's leading technology companies.



Worldwide representation.

Argentina • Australia • Austria • Bahrain • Belgium • Brazil • Bulgaria • Canada • Chile • China, PRC • Colombia • Costa Rica • Croatia • Cyprus • Czech Republic • Denmark • Ecuador • Egypt • El Salvador • Finland • France • Germany • Greece • Guatemala • Honduras • Hong Kong • Hungary • Iceland • India • Indonesia • Ireland • Israel • Italy • Jamaica • Japan • Jordan • Korea • Kuwait • Lebanon • Malaysia • Mexico • Netherlands • New Zealand • Norway • Pakistan • Peru • Philippines • Poland • Portugal • Puerto Rico • Qatar • Romania • Russia-CIS • Saudi Arabia • Singapore • Slovakia • Slovenia • South Africa, Republic • Spain • Sweden • Switzerland • Taiwan • Thailand • Turkey • United Arab Emirates • United Kingdom • United States • Uruguay • Venezuela • Yugoslavia

Allen-Bradley Headquarters, 1201 South Second Street, Milwaukee, WI 53204 USA, Tel: (1) 414 382-2000 Fax: (1) 414 382-4444